HERE ARE ALL THE FORMS NEEDE

Records can be maintained by one or more clerks proportionate to vo
acc



1

OWNER DRIVES INTO SERVICE STATION. SERVICE SALESMAN GREETS HIM. INSPECTOR TAKES CAR OUT WHILE SALESMAN INTERESTS OWNER IN ACCESSORIES
ESTIMATE OF COST AND DELIVERY DATE GIVEN REPAIR CONTRACT AND WORK ORDER MADE UP FROM INSPECTOR'S REPORT (IN TRIPLICATE)

REPAIR CONTRACT AND WORK ORDER No. 95
J. BUSH MOTORS CO.
Name John Jones Address 1218 14 St Phone No. H.P. 897
Mileage 5107 License No 120349 Promised 11/1/19 5 P.M.
Model K Engine No 41941 Date 11-1-19

Operation #2032
Clean carbon, grind valves
tune up

ORIGINAL

REPAIR CONTRACT AND WORK ORDER No. 95
J. BUSH MOTORS CO.
Name John Jones Address 1218 14 St Phone No. H.P. 897
Mileage 5107 License No 12034 Promised 11/1/19 5 P.M.
Model K Engine No 41941 Date 11-1-19

Operation #2032
Clean carbon, grind valves
tune up

DUPLICATE

REPAIR CONTRACT AND WORK ORDER No. 95
J. BUSH MOTORS CO.
Name John Jones Address 1218 14 St Phone No H.P. 897
Mileage 5107 License No 120349 Promised 11/1/19 5 P.M.
Model K Engine No 41941 Date 11-1-19

Operation #2032
Clean carbon, grind valves
tune up

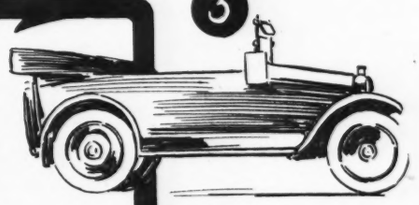
TRIPLICATE

YOU ARE AUTHORIZED TO MAKE SUCH REPAIRS AS ARE MENTIONED ABOVE AND FOR WHICH I AGREE TO PAY CASH AS PER YOUR ESTIMATE WHICH WILL NOT EXCEED $ 12.00
ACCEPTED BY H.P. CUSTOMER John Jones

2

OWNER SIGNS ORIGINAL AND IS GIVEN CONFIRMATION COPY

3



CAR WITH WORK ORDER ATTACHED GOES TO SHOP



4

SHOP CLERK ISSUES TIME CARDS AND MATERIAL REQUISITIONS

7

6

CAR COPY
OFFICE WH

RMS NEEDED FOR COMPLETE SERVICE REC

roportionate to volume of business. A general system must be elastic
accounting office are combined, likewise the shop cle



WITH WORK
ATTACHED
O SHOP

MATERIAL REQUISITION
Name John Jones W.O. No. 95
Model K Engine No. 41941 Date 11-1-19

Amount	Part No.	Name	Cost	List
1	791	Cyl. head gasket		

O.K. J.K.

7 SHOP CLERK SENDS MATERIAL REQUISITION TO STOCKROOM

8



STOCK MAN
FILLS REQUISITION

9



TIME CARD
Customer John Jones W.O. No. 95
Employee Name or No. 017 Date 11/1/19

	Description of Work	Elapsed Time	Salary Rate Plus-Overhead	Labor Rate	O.K.
7 A.M. START	Remove and install head Clean carbon Grind valves Tune up.				
4 P.M. FINISH		9	1.30	1.80	J.K.

6

TIME CARD
FILED IN JOB
ENVELOPE WHEN
COMPLETED

S TIME
AL

CAR COPY TO SERVICE
OFFICE WHEN JOB IS O.K.



5 CLERK MAKES OUT ENVELOPE FROM ORIGINAL COPY OF WORK ORDER AND SENDS LATTER TO ACCOUNTING DEPARTMENT. FILES JOB ENVELOPE AND ALL FORMS PERTAINING TO IT BY NAME

ND IS

ECORDS. HOW THEY ARE HANDLED AND WHE

astic, capable of expansion or contraction. In its simplest form the servi clerk and the stockroom

MATERIAL REQUISITION

John Jones W.O. No. 95

K Engine No. 41941 Date 11-1-19

Part No.	Name	Cost	List

MATERIAL REQUISITION

John Jones W.O. No 95

K Engine No. 41941 Date 11-1-19

Unit	Part No.	Name	Cost	List
	7910	Cyl. head gasket	3 15	4 20

OK

10

DUPLICATE MATERIAL REQUISITION FILED BY STOCK OFFICE AS A RECORD

STOCK OFFICE FILE

ORIGINAL FILED IN JOB ENVELOPE

11

9

STOCK CLERK PRICES ORIGINAL AND POSTS TRANSACTION ON INVENTORY RECORD

15

DUPLICATE INVOICE WITH C NOTATION JOINS ENVELOPE I PROCESS FILE IN ACCOUN DEPARTMENT

SERVICE INVOICE

J BU

John Jones
121 E. 14 St.
City

Special Remarks
Our inspector
motor leg bu

Amount	
1	Cyl. he Clean c time u As per e

12

CLERK COSTS JOB AND POSTS ON JOB ENVELOPE. ORDER IS CHECKED AND O.K.'D BY SERVICE MANAGER.

Name John Jones

Address 121 E. 14 St.

Model K Engine No. 41941

Date 11-1-19 W.O. No. 95

Invoice No. 101 Est. 18.00

Brief Of Work

2032
Clean carbon, Grind valves,
Time up.

	Labor			Material			Total
Dept	Hrs.	Cost	List	Cost	List	Cost	List
M	8	11 70	15 30	2 15	2 50	13 85	17 80

W.O. No. 95

18.00

13

SERVICE INVOICE MADE OUT AFTER COSTING

NDLED AND WHERE

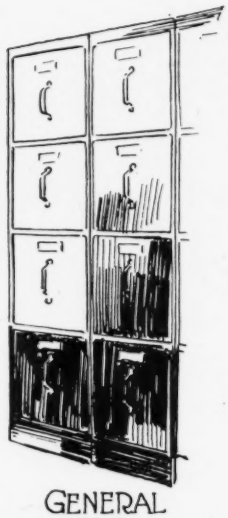
its simplest form the service office, cashier and

STOCK OFFICE FILE



16

ACCOUNTING DEPARTMENT PULLS ORIGINAL WORK ORDER FROM PROCESS FILE, POSTS ALL COSTS ON BOOKS AND SENDS JOB TO GENERAL FILE



GENERAL FILE

15

DUPLICATE INVOICE WITH CREDIT NOTATION JOINS ENVELOPE IN PROCESS FILE IN ACCOUNTING DEPARTMENT

SERVICE INVOICE No. 101
J BUSH MOTORS CO.
John Jones
121 E 14 St.
City
Special Remarks.
Our inspector reports body and motor leg bolts loose.
Date 11-1-19
Order No. 95
Their Order No.

AMOUNT	DISCRIPTION	PRICE
1	Cyl. head gasket clean carbon, grind valves tune up, As per estimate	18 00
	TOTAL $ 18 00	

12

JOB AND ENVELOPE. CKED AND E MANAGER.

CASHIER



14

CUSTOMER PAYS CASHIER AND RECEIVES ORIGINAL INVOICE AS RECEIPT

13

SERVICE INVOICE DE OUT AFTER OSTING

Organization chart of the service department of Henry Paulman, showing the place of each employee

Service Manager

Responsible for mechanical and financial efficiency of service station.
Directs entire station through department heads. Analyzes system and routine in shop and office.
O. K.'s pay rates for all service station employees.
Determines and passes on all policy allowance to owners. Submits monthly statements to management.
Supervises repair business to prevent slack periods.
Supervises minimum and maximum stock quantities.
O. K.'s all estimates and invoices to owners.
Handles most important mechanical matters with factory.

Chief Service Mechanician

Called on to discuss technical troubles with owners.
Tries out with owners and drivers, cars that are unsatisfactory.
Diagnoses and eliminates most serious cases of trouble.
Tries out jobs to be overhauled, analyzes and decides upon necessary repairs.
Directs testers.
Tests out all cars after trouble has been eliminated.
Tests out all repair jobs (passenger cars and trucks).
O. K.'s same and is held responsible.

Testers

Receive instruction from chief service mechanician.
Tune and adjust cars after each has been completed.
Final check all jobs before same is O.K.'d.
Reports to chief service mech., work not passable.
Locate noises and reports to chief service mech., for additional instructions.
Tests out cars after overhauling.
Fill out tester's report.

Pass. Car Service Executive

Meets all owners and drivers.
Enters all orders on passenger cars.
Turn car over to head service man or assistant to make preliminary test and recommend repairs.
Follows up work in shop as to time of delivery.
Notify owner if additional repairs are necessary and when cars are ready for delivery.
Directs outside service man.
Notify owner in outside territory of service man's visit.
Handles passenger car correspondence with owners and factory.
Analyzes and checks all jobs against original orders before billing.
Handles claim matters under direction of service manager.
Makes out estimates and submits same to service manager for final O. K.

Truck Service Inspector

Inspects each truck as per standardized inspection policy.
Instructs drivers and mechanics in care and operation.
Call to attention of owners condition of truck.
Decides with office and with truck owners as to time truck shall be sent in for repairs.
Reports to office at regular intervals during day.
Make written report to office on truck inspected.

Truck Service Executive

Arranges definite time with repair shop foreman when trucks are to come in and issue all orders for truck work necessary as advised by owners, drivers, or truck inspectors.
Supervises truck inspection and directs inspector movements, normally and in cases of emergency.
Keeps record of all policy and guarantee work on each truck.
Approves final repair charges to be billed to owners and suggests any adjustments necessary after consultation with service manager.
Keeps record of all repair charges made to truck owners, with record of truck mileage, tires, fuel consumption and average load as determined by test made by truck inspector.
Makes mechanical reports on trucks to factory at weekly intervals.
Handles all correspondence with factory and with owners regarding truck matters.
Makes out estimates and submits same to service manager for final O. K.

Traveling Service Man

Travels territory three times per year, in accordance with a definite schedule. Trips begin Mar. 1st, July 1st and Nov. 1st.
Calls on all owners in each town and city.
Tries out and inspects each car and truck to determine condition.
Tunes up and adjusts each car and truck.
Diagnoses and eliminates troubles.
Makes maintenance charge repairs, not requiring car to be sent to Chicago.
Acts as scout salesman.
Makes mechanical and commercial reports.

Shop Accountant

In direct charge of clerks.
Analyzes labor and material charges from job sheets and prepares invoice for billing.
Submits invoice to passenger car or truck executive for final O. K.
O. K.'s invoices for outside work.
Auditor to outline thru service manager accounting methods, but not to have direct supervision.

Clerks

Head Clerk
Enters time cards on job sheets.
Enters material charges from stock requisition on job sheets.
Assist making out shop payroll.
Storage record, of cars and bodies.
Keeps record of policy allowances on new cars and trucks.
File of shop employees history cards.
Stenographer and Bill Clerk
Bills out invoices as made up by shop acct. and all charges from sundry department.
Keeps file of all estimates.
Files correspondence, time cards and stock requisitions.
Stenographic work.
Stenographer and Cashier
In charge of cash sales in stockroom.
Make out orders to the shop.
Stenographic work.

Shop Superintendent

In direct charge of all repair work in machine, tin, blacksmith shops and motor and chassis depts.
Issues recommendation for additional repairs.
Supervises all work and sees that same gets out on time.
Responsible for orderly and efficient arrangement of work.
Oversees that shop records are kept correctly and up-to-date.
Employs men for shop.
Submits daily reports on repair jobs to service executives (passenger car or truck).

Chassis and Fin. Assembly For

Receives his instructions from shop superintendent or assistant.
Supervises and plans all work in his department.
Oversees all parts and passes his O.K.
Inspects all work while in process.
O.K.'s all work when finished.
Keeps necesesary records up-to-date of work performed in his department.
Notifies chief service mechanician job is O. K. for test.

Paint Foreman

Oversees and takes responsibility for paint and body work specified on shop order, also makes out the estimates.
Sets dates at which paint and body repairs can be started and when completed.
Keeps record of condition of body and paint on cars before and after repairs have been completed.
Also keeps details of body and paint work done on car.

Blacksmith

Working foreman.
Receives instructions from shop superintendent or assistant.
Completes work specified on order.
Supervises all blacksmith work.
Accept orders from supt. and shop foreman.
Studies time spent on different jobs.
Keep tools in good condition for shop.

Motor Dept. Foreman

Working foreman.
Receives instructions from shop superintendent or assistant.
Completes work specified on order.
Supervises all motor work.
Accept orders from supt. and shop foreman.
Studies time spent on different jobs.
Has charge of motor jobs done outside of department.

Stock Executive

Directly responsible for quantity of stock on hand and stock record.
Enters all orders for stock and material, also purchasing orders.
Has charge of all clerks connected with stockroom.
Keeps perpetual inventory daily.
Prices all requisitions.
Takes physical inventory once or twice a year.
Supplies the shop accountant with the stock room data on the various jobs as per requisition.

Tin Shop Foreman

Working foreman.
Receives instructions from shop superintendent or assistant.
Completes work specified on order.
Supervises all tinsmith work.
Accept orders from supt. and shop foreman.
Studies time spent on different jobs.
Makes fixtures and tools to facilitate better and quicker work.

Machine Work Foreman

Working foreman.
Receives instructions from shop superintendent or assistant.
Completes work specified on order.
Supervises all machine work.
Accept orders from supt. and shop foreman.
Studies time spent on different jobs.
Makes tools to facilitate beter and quicker work.
Maintenance of all machines.

Three Essentials of Rendering Good Service

Cleanliness



IT IS taken for granted that the service station must be a relatively grimy place, due to the character of its work. But this is all the more reason why strenuous efforts should be made to keep it as clean as possible. The lesson of cleanliness has been brought home again and again to the service station operator. Yet few of them accept the teachings of experience.

Observation in good service stations will prove that cleanliness induces efficient management, is a valuable aid in selling service, makes more contented employees, produces more and better work, and makes customers better satisfied.

A service station in Memphis, Tenn., washes its windows and skylight three times a week, flushes its repair shop floor twice a week and requires its service inspectors to put on clean white dusters every morning. One in Minneapolis requires its mechanics to put on clean overalls twice a week. Another in Philadelphia paints the columns in its building white every Saturday night so it can start the week with the service department putting up a clean appearance.

There is a service station which hangs this sign in its shop: "Keep clean and your work will follow the same channels." On entering the repair shop of this station one is impressed by its orderly condition. Mechanics are not running all over the place trying to find something. They have a place for everything and there is no semblance of the confusion which is so common in a great many shops.

People get things done by keeping at it, and if the appearance of a service station is to be kept up to a certain standard, one has to keep working to that end. This applies not only to the interior but to the exterior of the building as well. How often we have noticed a passing motorist drive up to a garage, give it a casual inspection, and if it does not present a creditable appearance drive farther on to find one which does? The motorist knows if he can find a neat appearing place he is more likely to get good work.

Cleanliness should not only be applied to the place itself and the tools the work is done with, but to the work itself. A repair job that is done mechanically perfect and should be a credit to the shop often loses its advertising value because the service department has delivered the car to the customer in a dirty and unorderly condition. A customer forms his impression of the job when he first gets into the car and if he finds the cushions and controls smeared with oil and grease he will probably lose sight of the merit of the mechanical job.

Equipment



LOCAL conditions, the volume of business and the character of the work govern the equipment a repair shop should have. The extent of the equipment is controlled by what is required for a profitable investment. It is easy to get a great deal of money tied up in machine tool equipment for which a shop seldom has use. Good judgment should be used as there are other departments in a service station where money can be used so that greater returns can be secured. This is especially true of the stockroom, wrich usually represents the greater part of the investment in a service station and if properly managed is a money maker.

Repair shops located in medium sized cities usually have the advantage of specialized machine shops which can make their machine tool equipment pay because they have sufficient work to keep the machine tools busy at all times. This is the great drawback to loading a shop with a lot of machine tools, as they seldom have sufficient work to keep the machines busy. Shops which are so located have little use for machine tools, as they can get their machine work done outside and thus reduce the investment the shop represents or else use this money to better advantage in other departments.

Large shops which have considerable business can afford to have a complete machine tool equipment because they have sufficient work to keep the machines busy. On investigation one will find that these shops started on a small scale and that they increased their equipment as their business and profits warranted.

The whole affair resolves itself into a problem in economics.

There are two classes of repair shops —those which handle one make of car and those doing general work where they have to handle a variety of makes. In the former a few special tools will be sufficient to do the work, as repair operations are much the same over the different models and the service work is simplified by the interchangeability of parts. A shop of this kind does not require many machine tools, as there is little variation in its repair work.

Shops of this kind simply need those special tools which will speed up their service and enable them to handle their jobs in the shortest and most efficient manner. Usually this equipment is not extensive and does not necessitate a large investment.

The general repair shop which handles all makes of cars must have a more complete equipment, as it must be able to make parts for obsolete cars.

Stock Room



A STOCKROOM should not carry more than a 40 to 60 days' stock of parts on hand, providing it has the transportation facilities to keep stock flowing into it constantly. This will enable the stockroom to turn over its stock five or six times in a year and realize the greatest possible net profit on its investment. By this method, the investment is kept at a minimum and is active at all times, as it is not allowed to lie inactive on the shelves of the stockroom but is kept busy constantly. This is the profitable way to operate a stockroom.

To be able to carry out this method of management successfully accurate records must be kept. The investment that a stock represents depends upon the amount of parts to be carried. The number of parts is governed by the danger limit set as a minimum from the sales records. If it is desired to carry a 60-day stock on hand then the danger limit for a part will be the number of sales of this part made over an average period of 60 days. Perhaps in a case like this a maximum of 90 days would be set so that it would be impossible to get more than 90 days' stock on hand without having it called to the management's attention.

Establishment of a danger limit divides stock into two classes, the active and the inactive parts. Parts should be purchased on the strength of the demand and then there will be no danger of loading the stockroom up with parts for which there will be little demand. The idea is to keep the number of inactive parts down to a minimum so there will be no great amount of money tied up in an inactive investment.

The activity of stock changes frequently as models become obsolete, so a close check on the parts on hand is necessary. If it is discovered certain parts are not moving, arrangement should be made to cut down the stock of these to conform to what the sales records determine the new danger limit. Usually excess stock can be returned to the factory providing it is found out the demand for it is decreasing. Factories cannot bear the burden of stock managers' mistakes, so arrangements should be made to return inactive stock at the time that the activity is on the decrease and not wait until the parts have been obsolete.

(*Continued on page 38*)

A SIMPLE SERVICE RECORD SYSTEM

Five Forms Sufficiently Elastic to Meet Needs of Large or Small Concern

THE ideal service record system is one which has least amount of work in handling and gives an adequate record of the transaction involved. All the direct records of a repair transaction can be cared for on these five forms:

1. Repair contract and work order.
2. Time card.
3. Material requisition.
4. Job filing envelope showing summary of costs.
5. Service invoice.

Any other forms than these are merely elaborations for analysis or for cross referencing between departments. In extremely large service stations where a considerable number of cars is worked on each day this is necessarily due to the size of the departments and the fact that it is efficient to have cross references of the work which is carried on by other departments.

An anaylsis of complicated systems such as some large service stations use, reveals they have about five basic forms and that the other forms which are used to supplement these might be dropped without injury to the system. However, if the supplementary forms were dropped it would cause a great deal more work in the compiling of records and that is the reason for their existence. Hence, it is purely a problem in economy of time and energy.

Five Forms Are Necessary

For the average service station the five forms mentioned are sufficient for its records as all costs and the distribution of labor and material in the various departments are shown on the summary of the completed job. This makes the system fairly simple and consistent with the records required.

Any service record system must be elastic and capable of expansion or contraction. The insert used with this article shows the various steps the forms must travel through for completion. In small service stations the service office, cashier and accounting office will be combined in one with one clerk doing all of the work indicated in the whole system or it may be expanded indefinitely.

Most service stations desire to operate on a cash basis and give estimates on all jobs. Experience has shown that this is the best way to manage a service station as it minimizes complaints and produces better satisfied customers. It enables the shop to study its own working conditions in a more complete manner and introduce time-saving methods.

The method to pursue in working out the estimate system in connection with the master sheet is described in an article in this issue. The principle feature of the master sheet is that it individualizes repair operations and enables the shop to handle its work on a set schedule. The method to follow in handling the mechanical work can be standardized for each operation and a fixed price assigned to it which places the estimate system on a definite working basis.

Two Estimate Analysis Forms Requisite

The two forms for estimate analysis shown in the article following this are necessary to keep a close check on the labor and material used on certain repair operations. Any variation in labor and changes in material prices immediately shows in the analysis so that a revision of the cost of any operations can be revised to suit new conditions. One of these forms is solely for the service salesman's use, as it gives him all of the desired data pertaining to any individual operation.

The insert in this issue shows the route the different forms follow in passing through the service department.

The system as a whole centers around the repair contract and work order. When an owner arrives at the service station he is greeted by a service salesman, who looks after his wants. If the owner is not positive as to what his troubles are, an inspector is assigned to test the car and determine the nature of the trouble. From the inspector's report the work order is made up in triplicate, and the cost of the job and the time of completion given the customer. The duties of the service salesman and the inspector do not cease here, as the service salesman should be responsible for the car being finished at the time promised and the inspector should be responsible for the mechanical condition of the car and see that it is delivered to the customer in a clean and orderly condition.

Work Order Important

The work order which contains a brief of the job by repair operation numbers, according to the master sheet and the car identification data, is made up by the service salesman. The original is signed by the customer and accepted by the service salesman. The customer is given the duplicate as a confirmation copy of the repair contract which he has signed. The triplicate copy is a cardboard copy which stays with the car until the work is completed. When the car is tested and pronounced O. K. by the inspector, this cardboard copy is sent to the service office, which is a signal for that office to close the order and make up the invoice.

The original copy of the order goes to the service office, where a clerk makes out the filing envelope which has the summary of the job form printed on its face. The filing envelope is then filed in the service office process file by name, where all time cards and material requisitions are filed in it as they are completed. After the service office has made out the filing envelope, which has all of the data pertaining to the job on its face, the original copy is sent to the accounting office, where the order is filed by number in the process file. This order is the accounting department's authority for collecting the amount of money that the estimate specifies and also serves as a check against losing any orders. If an order fails to come through from the service office the accounting department has a check against it in its process file, which serves the purpose of being a register of the work orders issued by the service department.

Time Cards From Triplicate

From the triplicate or car copy of the regular contract and work order which accompanies the car to the shop, the shop clerk makes out the time cards and material requisitions as they are needed. For instance, if a mechanic needs a cylinder head gasket on the job, he brings the work order up to the desk of the clerk, who makes out a material requisition in duplicate for the part. He sends this to the stockroom to be filled. After the requisition is filled by the stockroom, it is priced and posted on the inventory record.

In small shops the shop clerk will have charge of the stockroom and its records. He will issue the material requisitions, fill the order, price it and post the transaction on the inventory record. The duplicate copy is filed by the stock office for its records and to show its authority for issuing such a part. The original after being priced is sent to the service office to be filed in the job envelope.

In the service office all forms pertaining to a certain job are filed in the job envelope made up for this purpose. All filing in this office is done by name.

When the job is completed and approved by the inspector the car copy of the work order which has accompanied the job through the repair shop is sent to the service office. This is the signal that the job is completed and is ready for costing. As soon as the costing is completed, the service invoice is made up in duplicate from the data so it will be ready for collection when the customer calls for his car.

The customer receives the original copy of the service invoice as his receipt. The credit notation is stamped on the duplicate and it is then sent to the accounting office, where it joins the job envelope and the original copy of the order. All costs are shown on the summary form printed on the face of the job envelope and the accounting office posts all of the costs on its books, places the original copy of the repair contract and the duplicate copy of the service in-

(Continued on page 38)

1. GENERAL LUBRICATION AND MISCELLANEOUS
2. ENGINE
   - 20 Combination work
     - 202 Motor, clean and polish.
     - 2021 Motor, clean.
     - 2022 Motor, clean and paint.
     - 203 Grind valves, tune up.
     - 2031 Clean carbon, tune up.
     - 2032 Clean carbon, grind valves, tune up.
     - 204 Main and connecting rod bearings, take up on.
     - 2041 Main and connecting rod bearings. Remove motor and scrape in.
   - 21 Valves and timing gears
   - 22 Cylinders, bearings, etc.
   - 23 Cooling system
   - 24 Gasoline system
   - 25 Lubricating system
   - 26 Engine bonnet
   - 27 Muffler
3. CLUTCH
   - 30 Combination work
   - 31 Plates
   - 32 Bearings
   - 33 Shifter brake, etc.
   - 34 Shaft and drum
4. TRANSMISSION
   - 40 Combination work
   - 41 Gears
   - 42 Bearings
   - 43 Control lever
   - 44 Universal joints
   - 46 Shaft
   - 47 Case
5. RUNNING GEAR
   - 51 Fenders, frame, etc.
   - 52-3 Springs
   - 55 Torque arm and radius rods
   - 56 Rear axle and differential
   - 57 Wheels
   - 58 Brakes
6. FRONT AXLE AND STEERING
   - 60 Combination
   - 61 Axle
   - 62 Knuckles
   - 63 Gear and post
   - 64 Connecting rod
   - 65 Cross tube
   - 67 Housing
   - 68 Spark and throttle control
7. ELECTRICAL SYSTEM
   - 71 Battery
   - 72 Generator
   - 73 Regulator
   - 74 Starter motor and switch
   - 76 Ignition
   - 77 Magneto
   - 78 Wiring and ammeter
8. EQUIPMENT
   - 81 Horn (hand)
   - 82 Odometer
   - 84 Bumper and radiator guard
   - 85 Seat
   - 86 Tool box
   - 87 Lamps

FOLLOWING UP SERVICE WORK

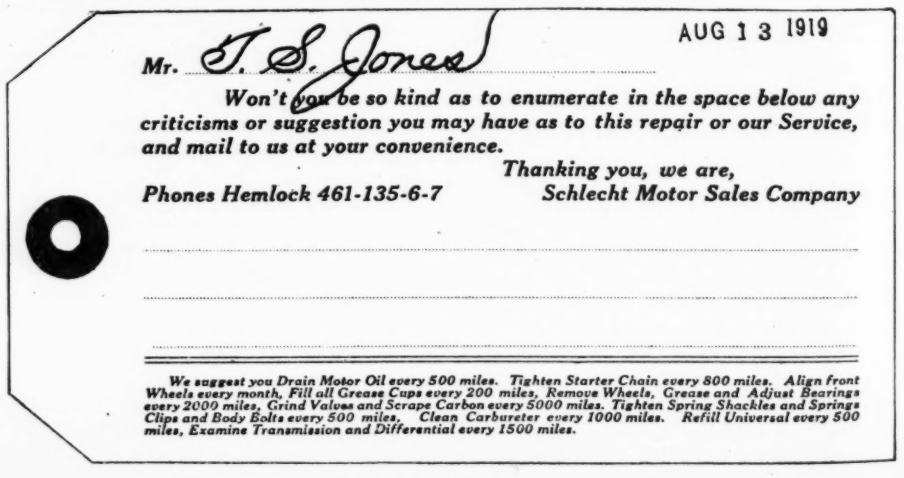
MANY service managers follow up their service after delivery to the customer to determine its effectiveness. Many owners become dissatisfied with minor things which happen to their cars when they were at the service station and never say anything about it to the management. The only way one can get in direct contact with these things is to take it up with the customer after he has taken delivery of his car.

Every one knows it is rather difficult to see things which are wrong in a service station when one is in such close contact with the thing itself. If a number of customers are dissatisfied with a certain thing, one can make up his mind that there is something wrong and go about finding a way to correct the error.

The small station cannot afford to have a representative of the service department on the road visiting customers like the large service station can, but it can secure practically the same results by requesting the customer to make suggestions through some type of form which can be either left in his car at the time of delivery or else mailed to him later.

A suggestion or criticism form can be made to serve a dual purpose. It can be arranged so it will remind the customer that there are certain vital parts of his car which need more care and attention than others. Perhaps the wording of these helpful suggestions to the customer can be placed in very definite form so he will know the exact number of miles at which the oil should be changed in the crankcase, etc. This can be applied to the remaining parts of the chassis and also to advertise accessories.

This same result can be obtained by having a follow-up letter for service which is mailed out to the customer about a week after he has taken delivery of his car. This should invite suggestions from patrons.



Specimen suggestion card

Service Profits Depend On:
MASTER SHEET
Repair Operations Analyzed to Give Basis for Estimating

EFFICIENT shop management can control the cost of labor on a repair job but cannot control the cost of parts. This fact is responsible for the master sheet. It individualizes repair operations, simplifies estimating and issuing work orders. Through its use each repair operation can be studied the same as any machine production job is studied to reduce the time required for that operation.

It gives experts an opportunity to study a complete operation and eliminate any waste time and energy which may be shown under old methods. This information passed on and demonstrated to mechanics makes marked reduction in the cost of labor for different operations. Under the old school, the cost of overhauling is all out of proportion to the original cost of the car. Parts prices are partly responsible for this condition, as in some cases they are exorbitant when compared to car cost. Some factory methods for estimating service parts requirements for a definite production are unsatisfactory and increase rather than lessen the evil.

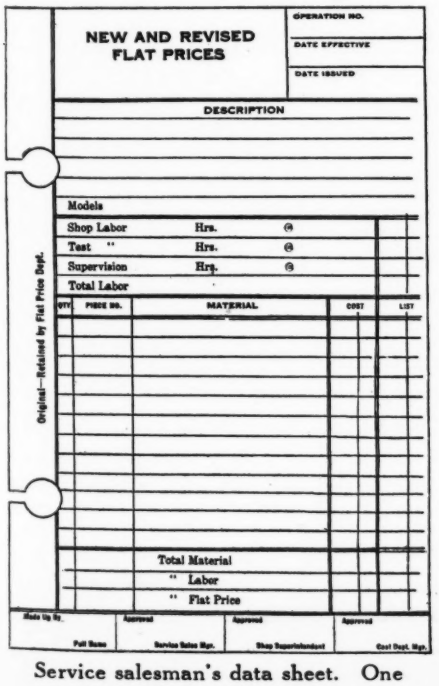
IN THIS SERIES

Service Profits Depend on—

THE ORGANIZATION
ROUTING OF JOB
BUILDING LAYOUT
EQUIPMENT
PARTS STOCK
STOCKROOM
SERVICE RECORDS
CONTRACTS
STOCKROOM SYSTEM
FINAL INSPECTION
MASTER SHEET

Each Operation Should Have Cost

A definite cost may be assigned each repair operation. This puts estimating on an accurate basis. This data can be obtained by the use of a repair operation analysis card. An analysis card is made out for each repair operation on the master sheet. In some cases an analysis card for each operation on different models will be required. Every operation which passes through the shop has its material and labor costs posted on these cards. An average and maximum value can be derived after about 10 jobs have been recorded. These figures are the maximum and minimum estimates for each operation.


NEW AND REVISED FLAT PRICES

OPERATION NO.
DATE EFFECTIVE
DATE ISSUED
DESCRIPTION
Models
Shop Labor Hrs. @
Test " Hrs. @
Supervision Hrs. @
Total Labor
QTY. PIECE NO. MATERIAL COST LIST
Total Material
" Labor
" Flat Price
Original—Retained by Flat Price Dept.
Made Up By
Approved
Full Name
Service Sales Mgr.
Shop Superintendent
Cost Dept. Mgr.

Service salesman's data sheet. One for each repair operation

Getting Data for Estimates

This gives the data for two kinds of estimates. The average value can be used for the flat rate plan. In this, the customer is quoted a definite price which he pays regardless of whether the retail cost to the service station exceeds or is less than the standard charge.

The maximum figure may be used where it is desired to assure the patron the price of a repair job will not exceed this figure. If the retail cost of the job is less, the customer gets the benefit, Regardless of the cost, the customer will not have to pay in excess of the maximum figure.

Both plans are in successful operation. The advantage of the latter is purely psychological.

Selling Service Systematically

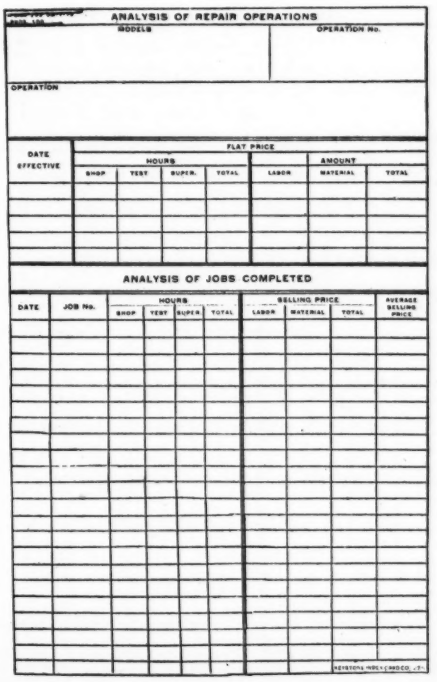
For selling service on a systematic basis an estimate book, preferably of pocket size, should be made, containing the details of each operation listed, including the material and hours of labor with the estimate price. The book should be arranged in order by the operation numbers, with a plan of the master sheet in the forward part as a reference.

By having the operations standardized, the preparation of a work order by the service men is simplified and the possibilities of misinterpreting an order in the shop are eliminated.

Master Sheet Must Be Flexible

The master sheet must be flexible so a new model with a variation in repair operations will not render it obsolete. The continuous number system of designating repair operations is unsatisfactory for this reason. The decimal number system is best, additions can be made without wrecking the entire system.

Repair operations on a master sheet can be divided into eight chief divisions with subdivisions for each. Each subdivision should have the operations particular to itself listed under it. To illustrate the method of designating repair operations by this system, the subdivision, combination work under the subdivision number 20 relating to combination work.


ANALYSIS OF REPAIR OPERATIONS

MODELS
OPERATION NO.
OPERATION
DATE EFFECTIVE
FLAT PRICE
HOURS: SHOP, TEST, SUPER., TOTAL
AMOUNT: LABOR, MATERIAL, TOTAL

ANALYSIS OF JOBS COMPLETED

DATE | JOB No. | HOURS: SHOP, TEST, SUPER., TOTAL | SELLING PRICE: LABOR, MATERIAL, TOTAL | AVERAGE SELLING PRICE

Form for analysis of jobs to determine estimate price

SERVICE RECORD SYSTEM

(*Continued from page 35*)

voice in the envelope and files the whole transaction in the general file under the customer's name.

There are various ways of filing the data of the job, but in small service stations it would be preferable to file the whole job intact and save having a number of files, as the invoice may be filed separate from the job envelope if it is desired to have another cross reference to a completed job. The fact that only a few of these jobs will ever be referred to practically settles the matter of filing the whole thing intact as being the best method.

INSTALLING OVERSIZE PISTONS

The Southern Motors Co., Packard, Hudson, Dodge Bros. and Essex dealer in Louisville, Ky., takes pride in its method of installing oversize pistons. Not a job of this character has proved unsatisfactory. First a micrometer is used on the cylinder wall to ascertain whether it is round. If badly out of true, reboring is necessary. After the reboring is completed, the mechanic fits the new piston so it will just enter the bore. It is then handlapped in ground glass to the proper clearance.

This gives a perfect bearing on the skirt of the piston and also removes any roughness which might have been made by the reboring operation.—C. C. Swearingen, Louisville, Ky.

What You Will Find in This Issue, and Where

(Concluded from page 8)

instance in the overhauling of passenger cars trucks and tractors the general methods of procedure are given, the general points to look for which may need repair are given, and step by step methods by certain particular features are offered. The same plan of reasoning which made those methods set in their order, the proper ones to follow can be applied to all the other lines of work.

Everything in this number has the one big thing in mind and that is **satisfaction at a profit.** If the service department cannot be made a profitable department then it becomes only an adjunct to the sales department and every hour's work in the service department becomes an item of loss to the institution. It is the purpose of this issue to show how the service department can be made a profitable one and one which will bring in sufficient profit to make the entire institution profitable.

Whether or not such special departments as battery repair department, radiator repair department, etc., are worthwhile will depend upon the individual conditions, but valuable suggestions for these departments or for special cases when such work has to be done are offered in later pages.

STOCKROOM SERVICE ESSENTIAL

(*Continued from page 34*)

These things must be observed if the entire stock activity is to be kept at a maximum.

Stockrooms are best judged by their order filling efficiency. Depending upon the volume of business, a report should be made up each day or each week, listing the number of items a stockroom is unable to fill and showing the number of items it did fill on demand. It is a good plan also to show the number of days' delay on unfilled items. Well managed stockrooms will be able to fill more than 90 per cent of their orders on demand.

Last year a certain stockroom made a remarkable record. It filled 98.2 per cent of its orders on demand. The stock activity was so regulated that it succeeded in turning its stock 5½ times in the course of the year.

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WILLYS CORP. OFFICERS NAMED

New York, Nov. 1—Official announcement has been made that the Willys Corp. organization is now complete and the company is an active going concern. The announcement of the complete list of officers, now made for the first time, follows:

John N. Willys, president; J. R. Harbeck, vice president, in charge of New York executive office; C. O. Miniger, vice president, in charge of Electric Auto-Lite Division operation; J. Allen Smith, vice president, in charge of New Process Gear Unit operation; J. V. Hall, vice president, in charge of motor car production; F. P. Decker, treasnrer, and C. S. Mertz, secretary.

The directors are John N. Willys, Edward F. Swift, F. S. Wheeler, J. H. Harbeck, Charles Stollberg, C. O. Miniger, J. Allen Smith, J. V. Hall, C. S. Mertz and J. E. Kepperly.

DEMANDS AIR SERVICE DEPARTMENT

Washington, Nov. 3—A demand for a separate department of aeronautics to save the aviation industry in this country and insure aeronautic progress and advance was made last week by Senator Wadsworth of New York, chairman of the Military Affairs Committee, when he protested against the elimination of the appropriation for $15,000,000 for military aeronautics made by the conference committee. Senator Wadsworth claimed that this country could not send three squadrons of airplanes into battle at this time if they were needed, and Senator Thomas declared that unless Congress awakens to the need for the development of aeronautics, the United States will find itself inferior in the air service to Mexico.

PLAN BIG SERVICE BUILDING

Buffalo, N. Y., Nov. 3—Buffalo is soon to have one of the largest and finest automobile salesbuildings and service stations in the United States. The Kane-Cadillac Co. has just purchased the seven-acre site of Carnival Court, an amusement park, at Main and Jefferson streets, paying $250,000 for the property.

Three acres of the property will be used for a new three-story service and sales building, for which ground will be broken as soon as the park amusement devices have been removed. The building will be one of the most modern and complete as well as one of the largest in the country, according to plans which are now being completed.

CHALMERS-MAXWELL TO COMBINE

Detroit, Nov. 1—Stockholders of the Maxwell Motor Co. and the Chalmers Motor Corp. have been ordered to deposit their securities with the Central Union Trust Co., New York, on or before Nov. 8, for the purpose of effecting the merger of the two companies. Announcement of the completion of the merger is expected shortly thereafter.

No information could be secured here officially as to the terms of the merger, but unofficially it is learned that the exchange of securities was recommended as follows:

Chalmers mortgage notes to be converted into or paid off by new preferred stock; Maxwell first preferred, 120 per cent of holdings, or 157,601 shares; Maxwell second preferred, 66½ per cent of holdings, or 67,348 shares; Maxwell common, 70 per cent of holdings, or 89,637 shares; Chalmers preferred, 105 per cent of holdings, or 46,200 shares; Chalmers common, 15 per cent of holdings, or 59,905 shares. Total, 420,691 shares.

The new capitalization will be $10,000,000 7 per cent 10-year notes, $3,150,000 7 per cent preferred stock and 420,000 shares common.

Jobbers' Show Is Opened

Exhibition of Automotive Equipment Association Has Successful Start

Convention Is a Feature of Chicago Gathering of Parts Makers

CHICAGO, Nov. 3—Predictions that the first annual exhibition of the Automotive Equipment Association would be the biggest thing from a business standpoint that the jobbers have ever staged give promise of being more than fulfilled. When the doors of Medinah Temple opened today they disclosed every inch of space taken by exhibits of equipment and accessories and during the day the first contingents of jobbers and dealers from all over the country arrived in greater numbers than is usual for the opening day of a six-day show.

Occupying the basement and auditorium stage of the temple as it does, the show is not meant to attract the eye of the ordinary show visitor. The booths are arranged for business purposes, just as the show is a business show. It is a trade show and the visitor not interested in trade affairs is not likely to receive a guest card. The mornings are reserved for the trade. That the trade will be there in numbers and for business purposes is assured.

Beginning Wednesday, also at the Medinah Temple, will be held the annual convention of the Automotive Equipment Association. Jobbers, manufacturers and dealers of automotive from all over the United States will meet to talk over their plans and problems. That a busy week is in store for them is evidenced by the convention program as announced by Commissioner Webster. Meetings of directors and of various committees, notably the Standardization Committee, preceed the formal sessions, beginning Wednesday. The headline speaker of the convention is W. P. Leeper, of the United States Chamber of Commerce. A frolic comprising a mock trial and a minstrel show will take place Thursday evennig.

ARMY CARS BRING GOOD PRICE

Washington, Nov. 3—All previous records for prices were smashed Oct. 23, at the seventh weekly sale at Camp Holabird, Baltimore, Md., when 222 unserviceable army motor vehicles were sold for $122,000. The sale was largely attended, the presence of many out of town buyers, some of whom had come from as far west as Iowa, making the bidding more than usually lively. A White truck brought the highest price, $2,200.

The offerings included Dodge touring cars and Hurlburt, White, Sedan, Heavy Aviation, Peerless and Gramm-Bernstein trucks.

Two hundred vehicles will be offered at each of the next two sales, among them Dodge, Hudson and Hupmobile passenger cars and Riker, Ford, Garford, Denby, F. W. D., Heavy Aviation, Light Aviation, Pierce-Arrow, Kelly-Springfield, Kissel-Kar and Lippert-Stewart trucks.

UNITED STATES PURCHASES ENGLISH DIRIGIBLE

Washington, Nov. 2—The United States will purchase one of the largest dirigibles manufactured up to this time from England, the R-38, a sister ship of the R-34, according to information made public today by Secretary of the Navy Daniels. Congress has appropriated $2,500,000 for the purchase of this dirigible, for the construction of a hangar and for the training of the crew. The hangar will be built at Lakewood, N. J.

The R-38 will be 694 ft. in lenght, 86 ft. in diameter, 93 ft. 6 in. high, and will be able to carry a useful load of 45 tons. The C-5 was only 195 ft. in length and 54 ft. high.

It is expected the ship will be capable of a speed of 60 knots, considerably more than 60 miles an hour. When full of gas she will have a capacity of 2,724,000 cu. ft., which is 15 times that of the C-5, the navy airship which blew out to sea at Newfoundland last spring while preparations were being made to cross the Atlantic.

POSTOFFICE ASKS SUPPLIES

Washington, Nov. 3—The Postoffice Department has compiled its proposals and specifications for motor vehicles and aviation supplies for the postal service for the first half of 1920. These are contained in a printed pamphlet which is to be filled in by bidders, showing prices and other details. The sizes of casing, inner tubes, tires and accessories will be needed and prices are asked for each individual size and individual article. Lubricating supplies of all grades and in quantities ranging from 5 lb. cans to barrel lots are required. Bids are asked on 9,000 gal. of Liberty aero oil, and 175,000 gal. of aviation gasoline. Complete tests are specified and the physical properties defined for both the oil and gasoline. Complete information can be secured, together with the blank forms to be filled in by addressing J. A. Edgerton, Purchasing Agent, Postoffice Department.



EDITORIAL



The Reason for the Winter Service Issue

PRIMARILY the purpose of this, the first Winter Service Number of Motor Age is to offer to its readers suggestions as to methods by which they, as dealers and service men in motor cars, trucks, tractors, accessories and equipment can, by using more intensively their facilities for rendering service, make their establishments pay a good profit during a period which for many of them has been a time of comparative stagnation.

THE term "winter" does not mean the same thing in all parts of the country. Special winter equipment and special service methods and accessories designed for extremely cold weather cannot interest the dealer in the far south, consequently there are such features of this equipment described in these pages which may not be of definite interest to him, as such, but the methods suggested for bringing these before the attention of the dealers' prospects and the ideas indicated can apply in great measure to any type of equipment. The special references to seasonal conditions can be used as hints to the Southerner to meet certain specific conditions in his own terriory, which are not predicated upon extremely low temperatures.

THE business man in the warmer climate may not feel that this number of Motor Age means much to him, because he may not have the cold weather conditions of his northern brother nor the consequent retarding in the use of cars. He may feel that on that account he will not need to take special measures to keep up his business curve over any particular months.

HOWEVER, it seems quite probable that during the next three or four months, many in the automotive trade, no matter what territory they may be in or what climatic conditions they have, will face conditions of the industry which will require that they take steps to make up for a falling off in deliveries of motor cars. The two great phases of the trade are merchandising and service. When merchandising becomes less prominent as a feature of his business, whether through lack of demand or lack of merchandise, the wise dealer turns to the service to keep his business going profitably.

UNLESS all signs at this writing fail, the dealer in any territory is likely to be in the position similar to that of the winter last year and the year previous. He will have plenty of demand but the number of new cars which he will have to sell probably will be considerably smaller than he has contracted for or that he feels necessary to carry on his business profitably. The steel strike delayed production a very great deal and its full effects have not yet become wholly apparent. It decreased the output of materials and parts for motor cars, a decrease which only now is beginning to be strongly felt.

EVEN more serious in its possibilities in the present coal strike. If, as seems probable at the present moment, the walkout of coal miners continues in spite of the efforts of the Government to check it, not only will the manufacture of passenger cars and trucks, as well as all other lines of merchandise be very greatly curtailed through the lack of fuel, but also the transportation will suffer to the same degree although not quite so quickly. The winters in our northern states where most of the motor car manufacture is centralized are not conducive to successful driveaways in quantity. Certainly even if it were possible to produce passenger cars and even if the manufacturers had stored up cars for winter delivery, which they have not, it would be practically impossible to begin to fill the needs of the dealers by driveaways, on account of road and weather conditions.

IF, as seems not at all unlikely, transportation facilities should be tied up in a sympathetic strike by the railroad brotherhoods, the whole industry of the country would be tied up. It is not anticipated that such conditions will become as serious as the above would suggest for any length of time, but such conditions are possibilities and must be looked at by the wise dealer.

EVEN without a coal strike or any other labor difficulty other than those we have had in the past, the production of cars this winter will not be sufficient to take care of the dealers' needs. It is his business therefore, no matter what part of the country he is in, or whether he has winter conditions in the strictest sense of the term, to take measures which will make his service department carry the overhead and pay a profit and keep the business going under conditions which are nearly as adverse as they have been during similar seasons of the past.

There is an Idea for You in Every Page of This Number. There Will be Others Next Week.

Vesper's Winter Service Message

By F. W. A. Vesper

(President, National Automobile Dealers' Association)

THE days when the motor car dealer began preparations for the closing down of his activities in the Fall has long since passed, because in the evolution of the motor car from a strictly pleasure vehicle to one of general utility, the discontinuance of the use of the car in the winter or laying it up, has virtually been discontinued and the wide-awake dealer can, through the few weeks of extreme weather, keep his business running practically at a normal rate if he will make his arrangements accordingly.

By proper organization it is possible to line up enough work in overhauling and general repairing to keep his shop normally busy and aside from this the sales end of his business can be made active, if proper attention is given to the sale of storm tops and other winter equipment. There may be some shrinkage in his merchandising department if the sale of oils and gasoline is taken into consideration, but if the sale of winter tops and other winter motor equipment is started early enough, this can largely be offset.

Time was when the average dealer advised laying up the car for winter and it is possible that this is still the attitude of some. If so, they are short-sighted, for the progressive modern dealer will encourage the use of the car where its general utility has not already been fully recognized.

Those dealers who are handling trucks and other automotive equipment in addition to motor cars will find a natural market if proper effort is made to utilize the winter time for sales.

The average dealer has been so long in the habit of waiting for his shop business to come to him that the idea of going out to get it has been only used by a few, but those few have been highly successful and have kept their forces busy and their organizations intact.



WHAT CHICAGO DEALERS DO

(Continued from page 13)

Personal calls upon farmers along in September or October, followed by letters, will bring a great deal of business for the small town service station and shop, he believes. In addition to this, letters should be sent out early in the summer to learn whether customers intend laying up their cars and trucks during the winter.

SPECIAL "OVERHAUL" OFFER

Special offers on a "light overhaul" combined with a painting job serve to bring many customers of the Studebaker Sales Co., Chicago Studebaker distributor, into the shop for work during the slack season. Once these cars are in the shop, a careful inspection is made of them and the owner notified as to what is needed in addition to the regular overhaul. In the majority of cases the owner acquiesces to these additional repairs, which bring up the receipts of the shop to normal months.

About Dec. 1 a letter is sent by the Studebaker company to all owners of cars of the models of the preceding three years. This letter, which is shown elsewhere in this issue, lists 21 operations in addition to body painting, and offers a flat rate for the entire work.

This letter sent out places a 60-day limit on the offer, which induces owners to bring their cars in early. A month later a second letter is sent out extending the time limit 15 to 30 days, and if business is still slack close to the end of the extended time, a third letter makes a further extension of the time limit.

Estimates are made as closely as possible on the "light overhaul" work, and it has been found that these jobs pay almost no profit. While the overhaul is taking place, however, an inspection is made which often discloses that considerable more work is required than is specified in the offer. Owners are notified of this, and in most cases agree to having the work done. It has been found that where a flat price of $100 was set for the original job, the actual work done on each car billed to more than $150 because of defects uncovered by the shop inspection.

RADIATOR AND HOOD COVERS

(Continued from page 25)

the radiator cover. Made by the J. P. Gordon Co., Columbus, Ohio.

TATCO—The Tatco radiator and hood covers are made of enameled drill, lined with heavy felt supplemented with two layers of cotton wadding. The curtain is made in one piece. Other styles come in long grain imitation leather, especially for high-priced cars. The curtain can be removed completely when desired. The Tatco is made by the Thomas Auto Top Co., Muncie, Ind.

ARTIC—Made of imitation leather, with a keystone type door, to give protection at the point where it is needed most. The leather is backed with kersey material. The hood or radiator cover can be had separately, if desired. They are made by the Cincinnati Auto Specialty Co., Cincinnati, Ohio.

ATLAS—These covers are made of imitation leather or fabric leather lined with kersey cloth or mackinac. The cover is attached by metal clips and has a one-piece detachable curtain. The cross piece or bands help to retain the shape. These covers are made for all cars, with a special size for tractors by the Atlas Specialty Co., Chicago.

ALLEN—This is a new type of radiator cover or shutter, consisting of a series of shutters which can be adjusted to any degree of opening from the dash. It also can be operated from the front of car. Comes as a radiator cover only. Made by the Allen Auto Specialty Co., New York.

WILCOX—Wilcox covers are made with a separate hood and radiator cover which fasten together with glove fasteners. Outside is of heavy dull pebbled grain duck, with lining of kersey cloth. On style No. 2 the outside is imitation leather and has an additional lining of duck. Made for all cars by the M. I. Wilcox Co., Toledo, Ohio.

Coal Strike Threatens Car Production

Manufacturers Already Hit By Steel Walkout, Having Scant Supplies of Fuel on Hand

IT'S just one thing after another with the motor car manufacturers. With their productions already threatened and in some instances actually curtailed by the steel strike, now comes the coal strike which promises to put even a more serious crimp into the business. And as a result the gloom in automotive manufacturing circles right at present is as dark and thick as soft coal smoke.

The steel strike supposedly has been broken, at least the steel companies have issued reassuring statements regarding their increasing production while the leaders of the strike have admitted to defeat. But the strike interfered very seriously with production for more than a month and as a result parts makers and even the great motor car companies have been forced to fall back on their reserve stocks of steel and it will be a long while before they will be able to replenish them and at the same time keep up to their production schedules.

Coal Strike Looms Serious

But the coal strike is even a more serious affair with the motor men. At most, there is only a 90-day supply of coal on hand and even that is liable to seizure by the government providing its plans to operate the mines despite the strike do not work out. Although the automotive industry was put on the partially preferred list by the government during the war—being one of the last of the so-called non-essential industries which was suspended—this will hardly be the case if the government is obliged to resort to a seizure of coal.

Unquestionably, the industries which will be put on a priority coal list will be those which have a direct contact with the public such as the packing industry, which furnishes food for the public, the clothing industry, which furnishes its raiment, etc. While no one denies at this time that the automotive industry is an essential one, even the champions of its cause scarcely will plead that it is as essential in its every day operation as the packing, clothing and allied industries are. The plain fact is that people must be fed, must be clothed and must be kept warm in winter, even if doing so deprives them of the privilege of transportation such as the motor car industry furnishes.

Any plea of manufacturers for operation due to the fact that trucks and cars are widely used for the transfer of food supplies from rural to metropolitan districts can readily be met by the self-evident fact that there are plenty of motor cars in the United States for that purpose and it will be preferable to switch the thousands of vehicles not now so essentially employed to diverting any of the scant supply of coal to building more cars.

Watch Government's Plans

But there is always a ray of hope even in the darkest cloud and automotive officials are watching eagerly to see what steps the government is going to take to carry out its announced intention of operating the mines despite the strike. At the time this article was written, the only steps which have been taken have been the securing of injunctions against striking, which injunctions were promptly ignored by the miners. As everyone of intelligence realized, you can't mine coal with injunctions.

But, like Bret Harte's Heathen Chinee, the government has some plans up its sleeve and it will be of interest and importance to see how these plans will work out. And by the time this article appears in print, we will know whether these plans have been successful in their preliminaries, at least.

The situation is best expressed in the language of H. D. McCollough, secretary-treasurer of the King Motor Co., who declared his company and the entire industry were beginning to feel the effects of the steel strike though there is no indication of a shut-down at present.

"However, you can't tell what will happen," he added significantly.

Detroit Makers Are Canvassed

A canvass of the manufacturers in Detroit with regard to the outlook at their plants revealed that they are safe for the present but viewing the future with alarm. Statements, secured in each instance from a high official, follow:

PACKARD—"We have only a 30-day supply of coal on hand and only the normal amount in transit. The outlook is dark, unless the strike is broken quickly. We have not been hurt seriously by the steel strike yet and do not expect to feel the real effects until the first of the year. With orders piled up the situation after the mills resume promises to be most serious. The condition in the sheet steel market now is critical."

DODGE—"We are in fair shape as regards coal. We always keep a big advance supply and have our usual amount in transit. We have not felt the effects of the steel strike to any extent."

HUDSON—"Our coal supply is sufficient to last us about 20 days and we have a lot in transit and are buying all we can get. We have sufficient steel to run us until May and are using substitutes wherever it is possible."

CADILLAC—"Our coal supply is in splendid shape assuring operation for from six to nine months. We are fairly well off in the steel end."

PAIGE-DETROIT—"We have about ten days' supply of coal on hand and only the normal amount in transit. We are hoping for the best. The steel strike has had its effect on the parts makers and naturally we have felt it but there is no indication of a shut-down."

Ford Has Plenty of Coal

FORD—"We have a plentiful supply of coal at the blast furnaces which in emergency can be distributed and used for steam coal. In consequence we are not worried greatly as to the effect of the strike in our plant. The steel situation is fairly good and we have not felt any material effect."

COLUMBIA—"The coal supply in our storage yard is sufficient to last us until spring. We do not expect to feel any effects from the steel strike for 60 days."

KING—"We have no coal on hand for an emergency but are relying on our source of supply where we were advised that it was not necessary for us to lay in an emergency supply. We were told we would be instructed in due time if such step became necessary. We are feeling the effects of the steel strike but at present there are no indications of a shut-down, though we look upon the situation as critical and you can never tell what may happen."

LIBERTY—"The coal supply we have stored in preparation for just such an emergency is sufficient to last us until Feb. 1. We regard the steel situation as serious. The makers of axles have felt the effects of the strike keenly and if there is not relief by the first of the year we will all have to stop. That is certain."

Maxwell Safe Until May

MAXWELL-CHALMERS — "A careful survey of the coal situation convinces us that our supply is sufficient to last us until next May without inconvenience in any factory or department. As to steel, we had some trouble on axles but we are all right now. The chief trouble now is in getting sheet steel for bodies. Steel mills are refusing any new business. The situation is critical and getting worse."

SAXON—"Our coal supply will last through February. Of course no one knows what the strike will amount to if it is called or how long it will last. It can not affect us for 90 days at least."

HUPP—"We have a supply of coal in our plant that will last us from 60 to 90 days and have 40 car-loads in transit. We are in good shape right now.

STUDEBAKER—"We are not so fortunate as some manufacturers, having only about 30 days' supply of coal on hand. We have many cars in transit but that does not mean much for the government is liable to confiscate that at any minute. In fact it is almost a certainty if the strike is called."

Makers Set Production Mark in October

Steel Strike Does Not Affect Output as Yet and Export Business Grows

DETROIT, Nov. 3—With an output of 7445 cars during October, the 34 automobile factories reporting established a record for 1919, April, with a production of 7089, occupying second place. Despite the steel strike and other handicaps, which it was feared might retard production, the industry shows healthy activity, and plans for expansion have been formulated at every factory to meet the constantly increasing demand.

The export problem, which began to loom large immediately after the armistice, has not been solved, and as one manufacturer put it, Latin America, England, France, Italy, Belgium and Sweden are "hungry for cars." In a majority of instances the manufacturers have been giving some little attention heretofore to export trade, but they realize that the growing demand makes extensions and expansion imperative.

American Cars Demanded in Europe

It is conceded even by the foreign manufacturers that they cannot reach quantity production to satisfy the demand. Then, too, American models have made such inroads in popular favor abroad that prospective buyers will not be denied and are showing an inclination to do without machines until their desires for American cars can be cared for.

Paige-Detroit Motor Car Co., with four representatives in the foreign field, has enlarged its export department and will devote much of the output to the foreign trade during 1920.

Scripps-Booth is receiving five orders for every one that can be taken care of, and, while every effort will be made to favor the American trade, proposed expansions will care for the export demand more satisfactorily.

The Maibohm Motor Car Co. shipped 20 chasses to England Friday, and has greatly increased its facilities for the manufacture of cars for export. Work have been started on the new factory for the Maibohm company and when finished it will be one of the most complete automobile plants in the world.

Dodge Bros., who have been in the export market for some years, will make no special effort to increase their foreign business. They contend that it simply is a matter of production and that at present it is a physical impossibility for them to expand their export business save at the expense of their patrons in America.

The Hupp Motor Car Corp. will make a bid for a large portion of the foreign business and will give as large a percentage of its business to export trade as any other manufacturer.

The King Motor Car Co., already enjoying a large share of business in South America, Belgium and England, plans greatly to expand its export trade and to that end is formulating plans for assigning a good percentage of its output to the overseas market.

The clamor from foreign distributors easily would consume the entire Cadillac output, according to officials of that company. So insistent are demands that the officials declare the foreign trade will take every car, with or without wheels.

Trucks Also Demanded

Foreign demand for trucks is equally great. The Olds Motor Works at Lansing shipped 500 trucks to England last week, and additions are being completed to the plant which will permit the company to devote a much greater portion of its output to the markets outside of America. The Olds company will add 3000 employees to its payroll within the next six months, with the addition of a new finishing and assembly plant, a new sheet metal and enameling plant and an addition to the main assembly plant. The foundry also will require 1000 additional men.

Manufacturers in a majority of instances plan to increase their production Nov. 1, and by Jan. 1 nearly all of the factories will have increased their output from 30 to 100 per cent. The Maibohm company with a daily production of eight cars will start on a schedule of 25 cars a day Nov. 1, and expects to turn out 7500 cars during the coming year. The Liberty Motor Car Co., with additions and extensions contemplated, will greatly increase its output during 1920, and then willl make a bid for export business. The company virtually is swamped with domestic orders now, and until additions are completed will make no effort to take on any foreign accounts.

The reorganization meeting of stockholders of the Saxon Motor Car Co. in New York Nov. 5 is expected to result in a financing program which will permit of additional facilities that will greatly increase production at the plant. The company already is doing considerable export business and is using the foreign newspapers and other advertising mediums extensively. One-third of the present output of the plant now is being sent to the foreign market, and with the proposed extensions, in the event the reorganization plan is successful, 50 per cent of the factory production probably will find its way to the overseas trade.

Labor Conditions Are Good

Labor conditions in the Detroit district, particularly outside of the city, are good. There is great need in Detroit for good common and skilled labor, but until some comprehensive plan for housing new families is evolved there is little hope for conditions being relieved. The Packard Motor Car Co. is short between 200 and 300 common laborers and between 75 and 100 skilled men. The housing situation still is serious and hundreds of employees sent here from the East have gone back after working 60 days and working out their transportation.

The W. A. Paterson Co., at Flint, now producing 10 cars a day, will double its output beginning Nov. 1, and even greater expansion is contemplated with the new year. The company is so far behind with domestic orders it will make no attempt for the present to get into the export field. Labor conditions at the plant are good.

The Jordan Motor Car Co., which shipped 150 cars to Chile during the present year, contemplates increasing that output to 400 during 1920, although no concerted effort will be made to cut into the foreign trade. The company has a number of dealers abroad and is shipping every car that can possibly be spared, although the domestic demand is great.

COMPARATIVE CAR PRODUCTION BY LEADING MAKERS IN SEPTEMBER AND OCTOBER

	Sept.	Oct.
Buick	500	500
Briscoe	50	60
Barlex	10	12
Cadillac	100	110
Chalmers	75	80
Chandler	90	110
Chevrolet	700	1000
Columbia	30	30
Dodge Bros.	425	400
Dort	100	100
Ford	3100	3100
Hudson	100	120
Hupp	50	65
King	10	10
Liberty	35	35
Maxwell	300	375
Oakland	225	225
Olympian	10	10
Oldsmobile	150	150
Overland	260	300
Packard	40	42
Paige	45	35
Paterson	10	10
Jordan	18	18
Maibohm	10	8
Reo	125	175
Saxon	30	20
Scripps-Booth	25	25
Studebaker	165	165
Winton	10	10
Essex	110	120
Grant	20	25
Peerless	20	25
	6948	7470

Plan for Big Air Show in Chicago Next January

CHICAGO, Nov. 3—Members of the executive committee of the Aeronautical Show of Chicago to be given in the Coliseum January 5, will leave for New York this week to conduct the drawing for exhibition space which will be held at the offices of the Manufacturers' Aircraft association. Applications for space continue to come to show headquarters, Secretary Hempel announced today, and as a result of the demand for space the management has decided also to occupy the Coliseum Annex.

"We have had such heavy demand for space from the members of the Manufacturers' Aircraft association, as well as from non-members, that we decided also to occupy the Annex, which will give us an additional 10,000 sq. ft. of floor space," said Hempel. "All the leading aeronautical concerns will make exhibits, and th show will be truly representative."

Packard Is an Entrant

Among this week's applicants are the Packard Motor Car Co., which will exhibit its latest Liberty motors and planes; the Dayton-Wright Co., which will show two planes, and the Aeromarine Plane and Motor Corp. It is expected all of the available space will be contracted for at the New York drawing, as the entire aeronautical manufacturing industry recognizes the fact that Chicago is the center of the country's commercial flying field.

The exhibits this year will emphasize the larger planes from four to thirty passenger capacity, and also machines capable of handling loads of several tons.

The immense strides made in commercial aviation will be illustrated at the Chicago Show.

CENSUS TO GIVE AUTOMOTIVE FIGURES

Washington, Nov. 4—The Department of Agriculture is co-operating with the Census Bureau in the taking of farm census and among other statistics it will gather information relative to tractors, passenger cars, motor trucks, lighting systems, etc. Questions have been compiled which will result in determining the numbers of tractors, cars and lighting systems in use.

MAKE TRACTOR DUTY DEFINITION

Washington, Nov. 2—The Canadian Board of Customs has rendered a decision specifying the articles that may be admitted into Canada as "complete parts" of farm traction engines and threshing machine separators at the reduced rates of duty provided for in item 447 of the customs tariff, according to a recent Commerce report. The rate under this item for imports from the United States is 17½ per cent ad valorem, while for imports from the United Kingdom and certain British possessions the duty is 12½ per cent. Iron or steel parts not entitled to admission under this item will mostly be classified as manufactures of iron and steel not otherwise specified, the duty in that case being 37½ per cent ad valorem in the case of articles from the United States. The importer is required to make a special declaration that the parts are for the purposes indicated.

N. A. D. A. VICE PRESIDENT IN EACH STATE

St. Louis, Mo., Nov. 4—A National Automobile Dealers' association vice-president will be appointed in every state as a result of the decision of the board of directors to put into force a provision of the articles of incorporation which had been held in abeyance during the war period.

Selection of these vice presidents will be announced at the Chicago members' meeting of the association to be held during the week of the Chicago show.

Plans are being made by Harry G. Moock, business manager of the association, to make this gathering the largest and most important of automobile dealers ever held. Several thousand are expected to attend the Chicago exposition and an effort will be made to get every one of these dealers into the annual convention. A banquet and entertainment probably will be one of the main features of this meeting of dealers.

PACKARD REDUCES PAR VALUE OF STOCK

Detroit, Nov. 4—At the adjourned stockholders' meeting of the Packard Motor Car Co. it was decided to reduce the par value of the company's common shares from $100.00 to $10.00, and the directors were authorized to make arrangements for the issue of ten shares of $10.00 par value in exchange for each present share of $100.00 par value.

This change has been made imperative because of the continued trading in Packard common stock, now selling above $280.00, a unit too large for satisfactory handling.

PAN ON FEDERAL GRILL

Chicago, Nov. 1—S. C. Pandolfo, president of the Pan Motor Co., St. Cloud, Minn., and twelve of his associates have been placed on trial in the Federal court at Chicago on the charge of using the mails to defraud. The trial so far under Federal Judge Landis brought out indications that charges of shady transactions in the promotion of stock of the Pan Motor Co., alleged by the Associated Advertising Clubs and by the Federal Government in its indictment may be sustained. The trial also brought to light the use of certain unscrupulous publications, masquerading as legitimate trade papers which publish articles lauding a financial scheme for circulation among prospects of the promoter.

Gotham Dealers Plan to Buy Their Own Clubhouse

NEW YORK, Nov. 4—The Automobile Dealers' association of New York, whose membership has been increased from 60 to 247 since early summer, has announced a membership contest which it is hoped will bring the roster up to 700.

With the slogan, "Every member is expected to bring in at least ONE NEW member," the association is offering an inducement to membership seeking on a large scale by putting up $1,000 in prizes. The member proposing the greatest number of new members will receive $350. The second prize is $200, third $100, fourth $75, fifth $60, sixth $50, seventh, $40, and eighth $25.

Members Based on Point System

Memberships for the purpose of the contest are classified as follows: For securing a dealer member 200 points, associate member 150, house member 50, non-resident member 25 points.

The contest started Nov. 3 and will end Dec. 6, and members enrolled during the period will be paid up by one year's membership fee to Dec. 31, 1920.

In an announcement giving the reasons for the campaign the association says:

"We need a club building all our own, worthy of the Automobile Dealers' association of the country's greatest city. We need such a building to attain our object of doing greater and better things for the service of the whole industry.

"To get it we must have money.

"To secure money we must have more members.

"Hence this campaign.

"And remember we are growing all the time, which means that eventually our present desire will become a necessity.

To Have Permanent Clubhouse

"A permanent association building would have a lounge room, billiard room, restaurant, theater, convention hall, shower baths, banquet halls, well kept library, and 100 rooms with baths."

The membership of the association as it now stands includes 71 dealer members, that is, firms selling cars or trucks. There are 54 associate members, including firms dealing in used cars, automotive equipment, tires, etc. There are 172 house members, which comprise individuals connected directly or indirectly with the automobile industry in New York and vicinity. In this class are officers of various associations connected with the industry and writers on automobile subjects for trade publications and news-

papers. There are 21 non-resident members, including a number of manufacturers or their representatives, automobile trade association officials in other cities, etc.

The re-awakening of the association, about to reach a climax in the membership campaign, has been brought about largely by the activities of Harry T. Gardner, formerly secretary of the Syracuse Automobile Dealers' association, who became executive secretary of the local organization last May. Since Gardner took hold, the association has rented two large floors in a building on Columbus Circle (Broadway) in the heart of Motor Row, one of which is used as a combination lounge and restaurant, and the other as a game room. The luncheon service has grown from nothing to an average patronage of 100 to 200 a day.

OHIO MOTORISTS SUPPORT TAX CHANGE

Columbus, Ohio, Nov. 4—Motor car organizations, good roads federations and in fact, good roads enthusiasts are supporting the proposed amendment to the Ohio constitution providing for the classification of property for taxation purposes, as it is believed it will partly at least solve the tax problem and grve greater amounts for road improvement and maintenance.

New Orleans Dealers Act on the Used Car Problem

NEW ORLEANS, La., Oct. 28—The problem of the used car has been attracting more attention in the South this year than ever before, largely because a large number of farmers who have had small cars have had the most prosperous year in their history, and are now buying larger cars, offering their own small cars in part exchange. Diversification of crops is largely responsible for this condition of prosperity, and, in Louisiana and Mississippi especially, the use of tractors has aided in the production of greater food crops in place of the old-time one-money crop of cotton.

As a result of all this the dealers who have banded themselves together in the Louisiana-Mississippi Automotive Trades association are anxiously studying the used-car stuation and endeavoring to establish some more or less uniform standard of values for these cars. Frank Weinberger, head of the Allen Sales Co. and one of the most influential and widely known dealers of New Orleans, has made a particular study of this branch, and at the Jackson meeting of the association spoke on the used car, saying in part:

"At our last meeting I spoke of three methods suitable and practicable for the handling of used automobiles, as follows:

"1—Department, or special used-car man.

"2—Appointment of a public appraiser.

"3—Establishment of a used-car exchange by all the dealers.

"Since I explained the above three methods two others have been suggested:

"4—To have all dealers report to the secretary of their local branch of the automotive trades association every trade-in, giving the make of the car, model, condition of body, tires, top, mechanical equipment, electric equipment, and price allowed. When the car is sold, the second report is made, giving the expenses and the price received, or both reports could be made at one time. The local secretary would tabulate this information, mailing it to all members of the association, as well as to the secretary-manager of the Louisiana-Mississippi Automotive Trades association every Saturday, or at least twice a month. After the dealer takes advantage of the information furnished him, especially if the used-car department is handled by one man, it should qualify him as an expert on used-car valuations.

"5—The other of these two new methods would be to use as a guide the National Used Car Market report, adhering to its 'as is' value, making necessary deductions where tires, top or any exceptional abuse demands them. If this idea is acceptable, it would be necessary to have it definitely agreed that the 'as is' price is the maximum allowance the old car is worth."

Olds Motor Works Starts Service Managers' School

LANSING, Mich., Nov. 3—The Olds Motor Works today began a three weeks' school for service managers, 600 employees of the company having been summoned to attend in three classes of one week each. Problems of the service department and the best methods of handling the business and the public are being discussed and ideas interchanged on the practical operation of the station. The second class of 200 will report next Monday and the third class Nov. 17. The company is furnishing various entertainment features for the "students" during their stay in Lansing.

The new closed car factory, covering 98,600 sq. ft. of floor space, is in full operation and 100 cars are being turned out every day. The force of employees is being increased as rapidly as possible and additions completed and contemplated will increase the employees' roster approximately 3000 within the next five or six months.

Welfare Department Active

Orders for more than 5000 bushels of potatoes have been placed with the company's welfare department and contracts have been placed in northern Michigan by John Chapman, head of the welfare department, which will insure prompt delivery of the spuds at a price of $1.25 a bushel delivered.

An evidence of the rapid growth of the plant is shown in the fact that the street railway company is building two extensions into the factory, one designed to handle the passenger traffic and the other freight. The railroad freight congestion has made some such step necessary and the electric line will relieve the railroads of much of the burden.

TO FORM LOCKPORT MOTOR CLUB

Lockport, N. Y., Nov. 4—Plans are under way to form an automobile club in Lockport, N. Y. John T. Symes, president of the Lockport Board of Commerce, has been chosen to select a committee which will decide upon a plan of organization.

LYONS TO SHOW MOTOR CARS

New York, Nov. 2—Products of the automotive industries are to be featured among the special exhibits at the spring term of the Lyons Fair, which will be held in Lyons, France, March 1 to 15, 1920. Announcement of the date of the fair, which is of international scope, was made recently by Ernest Perrin, official representative for the United States, with offices at 3 Park Row, New York.

An advance catalog will be issued and circulated in foreign countries one month previous to the opening of the fair. In order that participants may have the advantage of this advertising their entry forms must be filed with Ernest Perrin before Nov. 24. Exhibits must be delivered to the American Express Co., official carrier, by Jan. 15. Exhibitors who do not wish to be included in the catalog have until Dec. 31 to file.

BUFFALO TRUCK MEN MEET

Buffalo, Nov. 3—Motor trucks will help make productive thousands of acres of now unused land, A. R. Kroh, of the Goodyear Tire Co., told Buffalo motor truck dealers at a recent meeting. Mr. Kroh spoke after truck tours of many sections of the United States. He said:

"The dearth of labor is the sole reason for the non-productiveness of thousands of acres of land. Motor trucks will do much to relieve this situation."

James E. Van Allen, president of the Atterbury Motor Truck Co., delivered a strong attack on the unrest which is stirring labor in this country. He said the situation is one which can only be handled by stern action.

More than 100 truck and supply dealers attended the meetings. E. T. Parkes, president of the Buffalo Truck Dealers' association, presented A. W. Carpenter with a silver loving cup in recognition of his services in connection with the recent New York "ship by truck" tour.

Truck Show Is All Filled

Makers Take Entire Allotment for National Exhibits

Transportation Conference Is Expected to Be a Big Feature This Year

NEW YORK, Nov. 4—That truck makers are looking forward to 1920 as the big truck year and are making preparations to open their selling campaign at the New York truck show, which is to be held in the Eighth Coast Artillery Armory, Jan. 3-10, is indicated by the unprecedented demand for space. Manager S. A. Milos has announced that there will not be an inch of the 150,000 sq. ft. of floor space unoccupied when the show opens.

Unusual interest also is being shown in the big transportation conference which will be a part of the show. It will be held in the auditorium of the armory and the wide interest it has created is indicated in the information that is being asked by factory heads, traffic managers, shippers, salesmen and dealers in various parts of the country.

A complete presentation of the motor transportation problem will be given by men of recognized qualifications. The subjects will include merchandising of motor trucks, service from every angle, operating costs, proven sales methods, etc. Motion pictures and lantern slides will be used to illustrate several of the talks. The occasions will be held in the afternoon and evening each day of the show.

The motor truck conference will be repeated at the National Motor Truck show in Chicago, which follows the New York show.

LAFAYETTE PRODUCTION BY FEB. 1

Indianapolis, Nov. 4.—The Lafayette Motors Co. will start production of its new car Feb. 1, the plans contemplating an output of from five to 15 a day at the outset. An annual output of 3,000 is the goal set by President Charles W. Nash. Additions to the already large plant are in contemplation to take care of an increased production. Several buildings which were used in war work will be remodeled and put into use. The new car is ready for the road test and will be on exhibition at the winter shows.

D. McCall White, vice president and former vice president of the Cadillac company, declares the new car will be far ahead of any previous automobile built under his supervision. Many orders already have been booked on the strength of the reputation of the Lafayette officials for high class motor production.

STEPHENS DISTRIBUTORS MEET

Freeport, Ill., Oct. 31—Distributors of the Stephens Motor Works of the Moline Plow Co., to the number of fifty met in a four-day conference at the Stephens' factory here this week. The mornings were devoted to business discussions and the afternoons to golf and other sports. At a dinner, October 26, the sales organization was addressed by George M. Peek, president and general manager of the Moline Plow Co.

Sales advertising and service policies were under discussion throughout the meeting. E. H. Snavely, factory manager, urged the distributors to make a very thorough survey of their parts inventory, so the dead parts could be weeded out and the new ones gotten in. He made the point that the total of the inventory frequently was misleading because it did not always show a superabundance of dead parts and the lack of live ones.

The conference was under the direction of Sales Manager C. Roy Clough.

Stutz Is Back as Maker

Indianapolis Man Heads a $1,000,000 Corporation

Details of New Car Will Probably Be Announced Early Next Year

INDIANAPOLIS, IND., Nov. 6—Harry C. Stutz, who disposed of his interests in the Stutz Motor Car Co. some time ago, has re-entered the motor car manufacturing field at the head of a new $1,000,000 corporation. Mr. Stutz has been named president of the corporation and associated with him are Sam S. Murdock, vice-president; Henry S. Campbell, treasurer; A. Gordon Murdock, secretary, and Harry C. Stutz, H. S. Campbell, S. T. Murdock, James C. Murdock and H. H. Hornbrock, board of directors.

Details of the new concern have not yet been made public. It is known, however, that the corporation will operate a factory in Indianapolis and will build a moderate sized car. Plans have been sufficiently advanced to make announcement that the car will be exhibited in New York and Chicago at the time of the National Automobile Shows.

PLOT TO KIDNAP EDSEL FORD

Detroit, Nov. 1—A plot to kidnap Edsel Ford, son of Henry Ford, which Ford looks upon as a huge joke, was unfolded by a man claiming to be a private detective, and resulted in the arrest of four men in Toledo. One of the men arrested admitted the plot, but declared the alleged detective was the instigator. At a hearing in Toledo the four men accused were sentenced to three months in jail.

According to the plan, Ford was to be "doped" and taken to Mt. Clemens in a motor car, there to be secreted in a vacant house at the edge of town until his father paid $200,000 ransom for his release. He was to be kept in a straight jacket but given plenty to eat and well cared for until the time limit which was to be set for the payment of the ransom.

Funds for the purchase of the automobile, rent for the vacant house and provisioning for a two weeks' siege were to be secured by robbing the Ohio Savings Bank in Toledo. The kidnapping was scheduled for last week but on the day fixed for the bank robbery and the kidnapping to follow, the detective unfolded the plot which resulted in the arrests.

Show Truck Tour Film

Development Moving Pictures to Be Demonstrated to Sales Managers

Full Program of Detroit Meeting is Given Out By N. A. C. C. at Detroit

DETROIT, Nov. 1—Motor truck sales managers, who will gather at the Hotel Statler Friday, Nov. 7, for a two-days convention, will be given a 2,500 foot film demonstration of the recent motor truck development tour. The film show will be one of the few functions planned for the convention to which the public will be admitted. Entertainment features, including a "surprise," are announced by the committee in charge of the arrangements, among which will be a banquet, at which J. H. Higgenbotham, of Detroit will be toastmaster. Truck factory executives from all over the country will attend the convention and a program replete with features of interest to the organization is planned. Men known nationally in the industry will address the convention, among whom are Alfred Reeves, general manager National Automobile Chamber of Commerce; F. W. Fenn, secretary Motor Truck Committee, National Automobile Chamber of Commerce; H. S. Firestone, of the Firestone Tire and Rubber Co., and Charles A. Talbot, vice president National Bank of Commerce, Detroit.

The program which will be presented beginning Friday morning follows:

Welcome address—Edward N. Hines, president Detroit Automobile Club.

Response—J. E. Tracy, Milwaukee, president National Association Motor Truck Sales Managers.

Membership Committee report and new enrollments.

"Eliminating the Trade-in Evil"—J. W. Allan, New York.

"Practical Method of Determining Values of Used Motor Trucks"—H. H. Shuart, secretary Detroit Automobile Dealers' Association.

"Selling the Farmers and Operators of Rural Motor Express Lines"—F. W. Fenn.

"Effect of Pneumatic Tires on Truck Sales"—C. A. Wales, Bridgeport, Conn.

"Prohibiting Licensing or Taxing of Motor Trucks and Motor Truck Legislation Generally"—Alfred Reeves.

Curtiss Plant for U. S?

Congressional Committee May Take Over Abandoned Factory

Will Be Used First for Storage and Later for Production

BUFFALO, Nov. 4—That purchase of the Curtiss airplane factory in North Elmwood avenue, Buffalo, soon will be recommended, was indicated by members of the special Congressional committee which recently inspected the plant.

Members of the committee indicated they would make such a recommendation to the House military affairs committee. In the event of purchase by the war department the factory building would be used for a time, as at present, for storage of large quantities of army material. Later the factory might be reconverted into a production plant for army airplanes.

The factory was regarded during the war as the largest and best equipped airplane factory in the world. When the war ended the Curtiss company discontinued operations in the plant, and has been producing its planes in two other factories in Buffalo. A great quantity of war material has been stored in the North Elmwood plant.

RECIPROCAL LICENSES URGED

Washington, Nov. 1—A bill has been introduced by Congressman Sweet to permit owners of cars properly registered in one state to travel into other states, without taking out additional licenses or making payment of additional taxes. The bill also provides that any one temporarily residing in the District of Columbia and retaining citizenship in another state must comply with the laws and regulations of his state in order to be able to operate his car in the District of Columbia.

The Secretary of State is authorized by the act to make arrangements with foreign countries so there will be reciprocal courtesies in regard to the registration and operation of automobiles.

The bill is aimed chiefly at the present unreasonable arrangements between the District of Columbia and Maryland, it being necessary for a driver registered in the District of Columbia also to register and pay taxes in the state of Maryland before he can operate in that state, and vice versa.

PLAN TO INCREASE STUDEBAKER STOCK

Detroit, Nov. 1—Stockholders of the Studebaker Corp. will vote on the plan to increase the common stock of the company from $30,000,000 to $75,000,000 and retire $15,000,000 7 per cent serial gold bond notes, at a special meeting to be held in South Bend, Ind., Nov. 24. The directors of the company meet this week to act on dividend disbursement and it is reported the rate will be increased from 4 to 7 per cent.

The new stock plan contemplates offering 150,000 shares to stockholders of record Nov. 29 at $105 a share and to issue subscription warrants to cover such rights, which are to be exercised not later than Dec. 13. Sale of new stock will provide funds for retiring the notes.

ARMY TO SELL GASOLINE TO CIVILIAN FLYERS

Washington, Nov. 4—A bill has been introduced into Congress which authorizes the War Department to sell gasoline, oil and aircraft supplies to civilian aviators at the contract price plus 10 per cent when they land near aviation fields and are in need of assistance for the continuation of their journey or for the protection of the passengers or crew. The provision in the bill is to the effect that only limited amounts are to be sold, the limit being the quantity neecssary to enable the aviator to reach the nearest point where he can purchase supplies.

CARTER NEW BUICK BRANCH HEAD

Chicago, Nov. 3—D. A. Burke, for many years manager of the Chicago branch of the Buick Motor Co., covering Illinois, a part of Indiana, Iowa, Wisconsin and Missouri, has resigned to take a higher executive position in another division of the General Motors Corp. He is succeeded by Horace P. Carter, who has been continuously associated with the Chicago and Milwaukee branches in an executive way for the past five years. He has been general manager of the Milwaukee branch of the Buick Motor Co., for the past two years.

PACKARD MEN GIVE EASTMAN BANQUET

Philadelphia, Nov. 1—Seven hundred and fifty members of the Packard Motor Car Co., of Philadelphia organization and their friends attended the farewell banquet at the Bellevue-Stratford Hotel, to Lee J. Eastman, the retiring president, who has been chosen president of the New York branch. A gift from the employees was a suitcase. Various other gifts were presented by the officials of the local company.

THEY SAY YOU CAN'T WEAR 'EM OUT

Columbus, Ohio, Nov. 3—In the salesrooms of the Denk-Thompson Co., Ford dealer of Columbus, is a Ford touring car with frame No. 604, sold 16 years ago and used constantly up to this time. The agents allowed $50 no the car in payment for a new Ford. Apart from style the old-timer is about the same as the present Ford as it "goes," and the motor is some years this side of being a pensioner. The engine is cranked from the side and the steering wheel sticks straight up.

STUDEBAKER BOND THEFT CLEARED

South Bend, Nov. 1.—The mysterious disappearance last January of $250,000 worth of liberty bonds belonging to the Studebaker Corp., was cleared up yesteryesterday by the confession of one of the Studebaker employees who admitted the theft. The bonds had been sent to the corporation by registered mail from a Detroit bank, and were taken by a telegrapher in the employ of the company. He found them on the floor after closing time. The thief says fear of discovery caused him to burn all but three of the twenty-five $10,000 bonds, and these were recovered.

TO GIVE ARMY SHOW IN CHICAGO

Chicago, Nov. 4—The Motor Transport Corps, United States Army, contemplates an exhibit at the First Regiment Armory, Chicago, December 4, 5, and 6, at which time it will display practically all the various types of motor vehicles constructed for and used by the Army during the war.

Get Cars by New Method

No Need to Steal Cars in Carolinas, Say Dealers of That State

N. A. D. A. to Work for Repeal of Law Called An Injustice

ST. LOUIS, Nov. 3—How a state law is being used to "bleed" automobile owners was disclosed at the directors' meeting of the National Automobile Dealers' association in Denver by George D. McCutcheon of Atlanta, director for the association. McCutcheon called attention to the fact that in both North and South Carolina there is a law providing that wherever an automobile injures a pedestrian or other person by collision or otherwise, the person so injured may institute a suit for the forfeiture of the vehicle.

This law has been taken advantage of in a curious manner. The courts have ruled that any one driving an automobile with the owner's consent stands in the same relation before the law as the owner. Under this interpretation chauffeurs take out expensive, high powered automobiles and having previously conspired with unscrupulous persons have accidents in which pedestrians are run over and injured, though seldom seriously. Instead of buying an automobile or stealing it, the "prospect" in North and South Carolina is now going out, spotting the car he wants and permitting it to run into him.

So serious has this situation become and so dangerous to the automobile owner that the National Automobile Dealers' association passed a resolution denouncing the law and pledged its support to the newly formed bi-state trade association of the Carolinas that when the legislatures next meet the national association support would be given to the local dealers to obtain the repeal of these statutes.

Shop Service in Winter —"According to Plan"

Suggested Outline for Procedure in Overhauling — With Special Reference to Adjustments Necessitated With the Coming of Winter

By Roy E. Berg
(Motor Age Editorial Staff)

NECESSITY of periodic and careful overhaul of machinery is a fact that to the mechanical mind is apparent and to the lay mind is scarcely less appreciated, but with the latter the subject is given less attention, hence the need of the mechanic.

Considering the car as a whole, it is possible to outline a system which embraces the inspection, the repair and the final adjustment of all cars in a manner common to all.

Outlined here are the various parts of the car. While it is true that there is considerable difference between a Pierce-Arrow car and an Overland, it is not less true that the division of component parts in this list is applicable to all types of car, the differences in construction resulting from different designing rather than variation from principle.

Handle Several Makes of Car

A good mechanic may easily work on different makes of cars with the same accuracy and rapidity as if he had worked on that one car alone during his experience as a motor car mechanic. His natural dexterity and ability will make him quick to appreciate that a quarter turn of an adjustment screw on one type of ring gear adjustment collar and a turn and a half on some other type does not necessarily constitute a departure from construction principle.

What to do in an emergency in order that a stranded car may be brought to the service station, requires different treatment from the problem of overhaul. Emergency repairs are made to last for the time being only, but work done during an overhaul must be an actual "renewing." For, the car must again be made ready for the road and when finally turned out should be in as good condition as a new car, better in fact, because a new car has not as yet been "run in," while an old car, rehabilitated, has been run in and has, figuratively, had the wrinkles ironed out of it. So it is well to bear in mind that work brought in for winter service should be done thoroughly with the thought in mind that every thing done must have the appearance and actual qualities of durability and permanence.

Cooling Is Given in Detail

The subject of cooling and the repair of the radiator, for instance, is taken up, with an outline of the methods used, the cleaning and testing of the radiator is given. One of the most frequent difficulties experienced by the motorist in this connection, during the winter, is the freezing of radiators. The repair department should have a carefully outlined plan by which these cases can be most economically handled. We are suggesting the plans for the construction of a radiator repair stand which greatly facilitates these repairs. Then again we illustrate and describe the methods employed in the repair of a tubular radiator.



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"Accessory Display" Sells Service

Attention to Steering Gear

Regarding the adjustments necessitated by the coming of cold weather, it might at first thought be said that the lubrication is about the only thing which needs attention. Investigation shows, however, that with a poorly charged battery electrolyte is apt to freeze. That is, because of the increased difficulty in carburetion, the drain on the battery is much heavier during the period of starting. From this it follows that the generator should charge slightly more during the winter than during the summer. Further investigation shows that the steering gear should be more reliable in the winter than in the summer because of the increased difficulty of handling a car on a road covered with snow and ice. Likewise the brakes should be adjusted with greater care. The wheels are much more apt to skid on a snow covered road than on a dry road and the importance of seeing that the brakes take hold evenly becomes of paramount importance.

The preparation of the shop to meet this incoming business bears close scrutiny, for it is only through a well-arranged shop, where system and efficiency predominate, that the dealer will be able to take care of this winter service.

Cleanliness Is Necessary

First of all, go over the repair department and give it a thorough cleaning. To the business man bringing his car into a clean shop this makes an indelible impression. This is the type of man who is used to having his office clean and presentable, and he likes to see the same thing in the shop which is going to handle his car. He likes to think that when the car is ready any member of his family can go to the service station and call for the car, being sure that it will be clean.

Have on hand some equipment that will assure the car being turned out free of grease. Fender covers are a cheap investment in this line. Be sure that the men are properly arrayed in clean overalls. One successful shop that the writer has in mind, furnishes white overalls to the men. A clean pair is issued daily. The impression that this creates has resulted in so much service business for this man that he feels sure it would pay to furnish two, or three if the need was there, clean suits a day.

Care and Repairs Of Radiators

THERE is always considerable radiator work to be done in winter, chiefly because car or truck owners become careless and allow the water in them to freeze and burst them. Aside from this, however, a great deal of work may be done on radiators in the way of getting them in shape for the winter season. This means they must be put through certain tests to find any clogged spots, and must be cleaned out thoroughly and soldered up so that anti-freeze solutions may safely be introduced into them.

This is the time of year when dealers should encourage owners to drive into their service stations and have their radiators checked up for leaks and other derangements of the cooling system looked after. Half of the success of using an anti-freeze solution lies in getting the radiator and hose connections in shape.

It is quite common for an owner to drive into a service station and complain that the cooling system is not operating properly and everything from the pump to the gasoline mixture is suspected. In a case like this it often happens that the radiator has a cool spot in it. That is, there is a portion of the core filled with mud or some other foreign deposit, which makes it impossible for the water to circulate properly.

The only thing to do in such a case is to put the radiator through a third degree, which means it must be removed and tested in a tank of water. Radiator repair work really demands some sort of good bench or stand to hold the radiator, and while the stand shown below is all right for the purpose, in the long run the dealer will probably be better off by buying one of the stands on the market. Stands for this purpose are made by the Gibson Co., Indianapolis, and the Fairbanks Co., Chicago. They are made of steel and have clamping devices which make it possible instantly to change the angle of the radiator position. Half of the time spent in soldering up a radiator is often given up to getting the job in th right position.

When the radiator is off, the mechanic is given a good chance to inspect other parts of the cooling system, such as the pump, water pipes, etc. All of these things are important in keeping the engine tuned to concert pitch for winter driving.

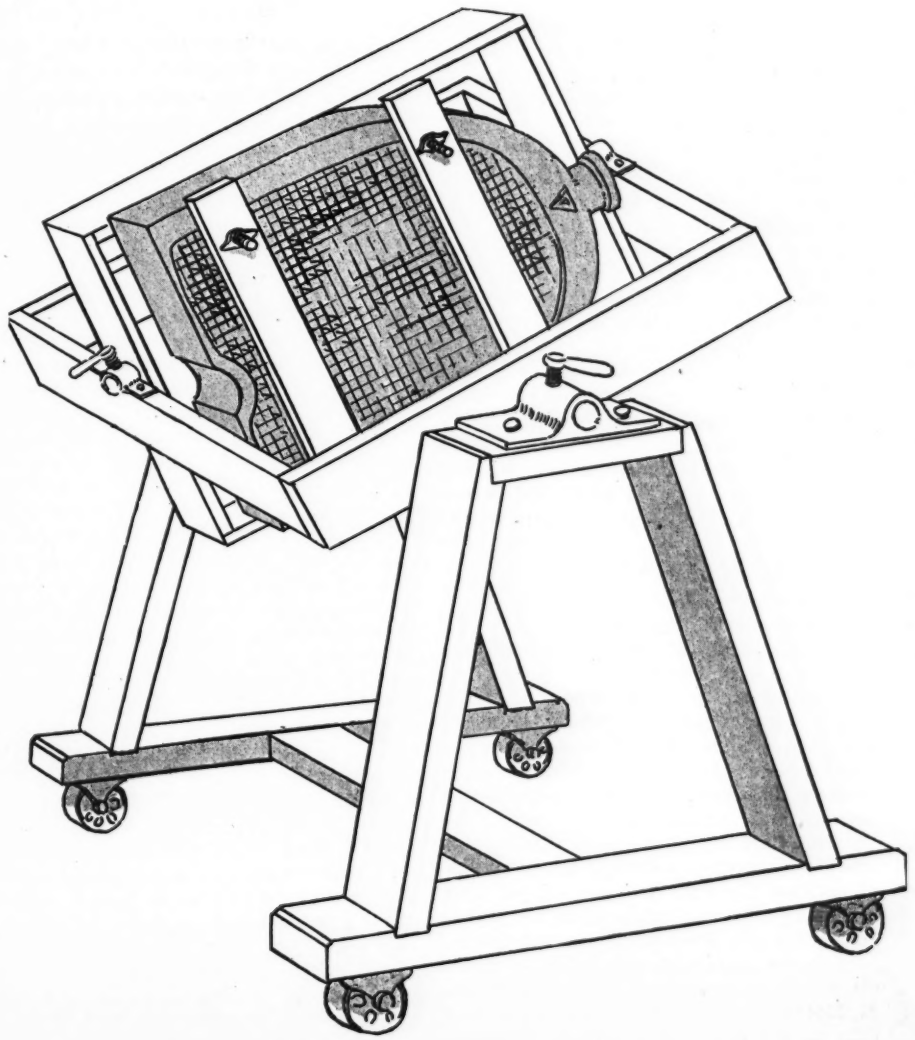
Good Radiator Stands Are on the Market, But if You Must Make One Do It This Way

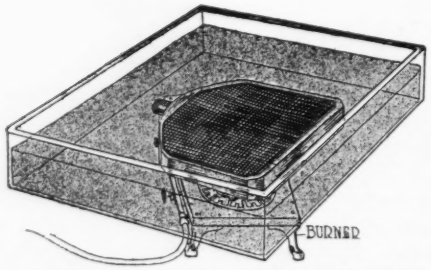
MUCH of the work on radiators is soldering, and solder will not flow uphill. A radiator is a difficult piece of apparatus to hold while working on it and often has to be tilted in a certain way to get the solder to run. Much time is often wasted in shops in getting the job into position to work on, and not only will time be saved by making the radiator stand shown herewith, but better work results when the mechanic is able to get at a job easily.

The construction of the stand is plainly shown in the illustration. For convenience it is mounted upon castors so it may be shifted about to get the right light on the work or carry the work to another part of the shop. If service is given on one make of car only the stand can be made to hold the radiator of that particular car, otherwise the framework will have to be built to take the largest sized radiator likely to be worked upon.

The standards can be built of oak or ash 1½ in. thick by 4 in. wide, with mortised joints, fastened by screws and glue. The top of each standard carries a castrion pillow block or bearing, which should be drilled and tapped for a machine screw on which has been fastened a short level. This is for tightening the swinging framework in any position. The framework can be made of oak or ash 1¼ in. by 4 in., with the corners reinforced by I-irons on the inside. The smaller frame swings in the larger at right angles to the axis of the latter and is clamped in the same way. This permits holding the radiator in any conceivable position.

The radiator is held in place by two wood pieces which are clamped against it by long bolts of small diameter and fitted with wing nuts.





Radiator in lye and hydrochloric acid bath kept boiling, to remove foreign matter

A radiator which has a cold spot in it while the remaining parts of the core are hot must be cleaned in a tank, as shown on this page. This tank should contain a solution of lye and hydrochloric acid in water, so as to saturate it, the percentage of acid being very low, about 5 per cent. This solution is heated by a burner and the radiator allowed to remain submerged for about 24 hours. After this it is removed and clean water forced through it; generally a great deal of mud will be washed out.

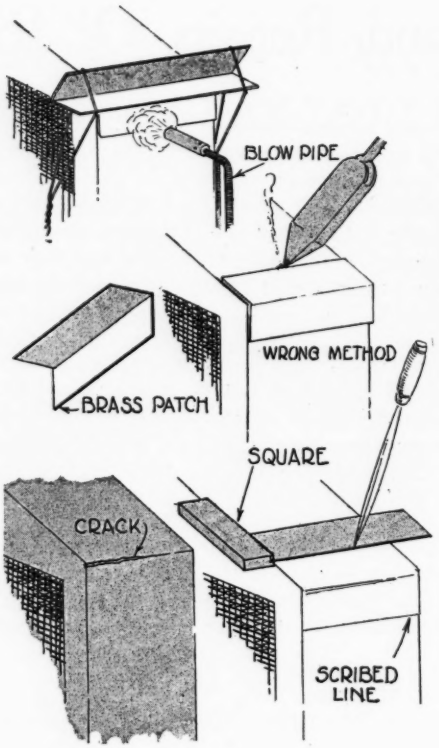
Close Openings with Solder

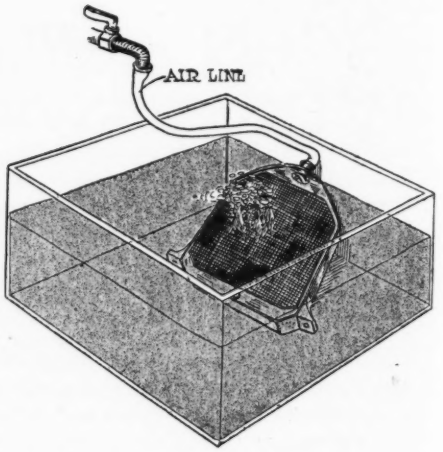
After this treatment all the openings are closed with corks or soldered. A hole is made in the solder or cover of the filler pipe and an air line fitted to it. The radiator is placed in the tank and air turned on with about 20 lb. pressure. All leaks will at once become noticeable by the bubbles. If a leak is found it should be soldered and the radiator again submerged for test.

The proper way to put a patch on a radiator is by sweatings it on ,and should the patch be on one the upper parts of the radiator put another patch on the opposite side to balance up the job. The balancing patch can be tacked on with a little solder by the copper bit. Patches can be made of 20-gage brass or copper bent to conform to the angle of the radiator. The surface of the latter should be scratched with a scriber and the space between the marks cleaned with emery cloth. Both the space and patch should be tinned with the soldering copper and the patch then held in place by clamps of some sort. Heat from a blowpipe will sweat it in place. The edges are smoothed with file and emery cloth.

Two Types of Repair

As a general thing the repair of radiators divideds itself into two classes, that of tubular and cellular types. Very often the repairs can be made without dismantling the whole radiator, but where a car has been in a smash and the radiator severely damaged it is generally better to remove the shell, unsolder the top and bottom tanks and remove the core. Tubular radiators are easier to repair than the cellular types, as many times a tube of smaller diameter can be slipped into the leaky tube and soldered to the latter at the top and bottom. The steps necessary in the repair of both types of radiators will be described in coming issues of Motor Age. Next week's issue will take up the repair of a tubular radiator.

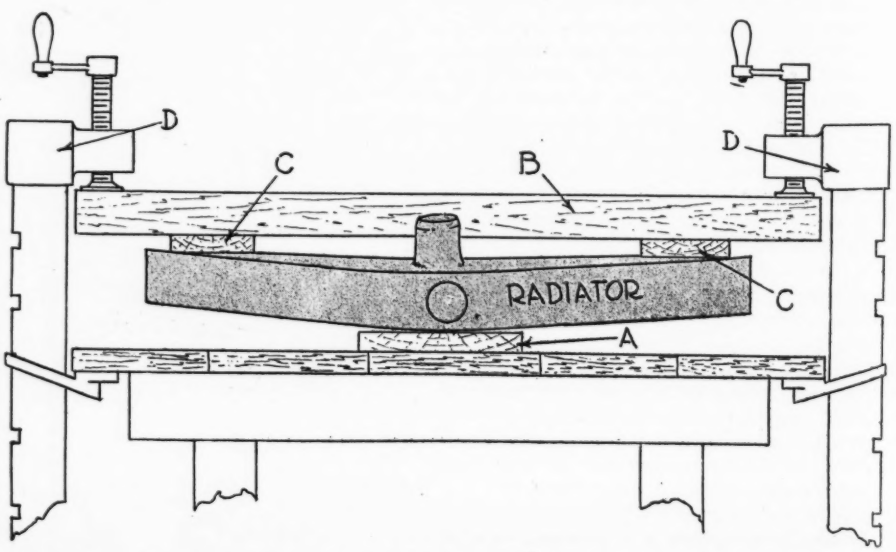




Above, openings in radiator sealed and comressed air forced through it to detect leaks. Left, steps necessary in the process of sweating on patch to radiator. A soldering bit should not be used; a blowpipe being far superior

So far as equipment for handling radiator work is concerned, little is necessary, although, like many other things, the better equipment you have the better able you are to take care of a large volume of work. A testing tank is necessary, because it is the only ready means by which suspected leaks can be found. Air for testing purposes can be taken from the compressed air supply. Other tools and equipment needed are a blowtorch, soldering coppers, scrapers, bench or stand for holding radiators, tinner's snips, melting ladle, blowpipe, assortment of large corks or stoppers for openings in radiators, solder, files, etc. For straightening radiators two long carpenter's clamps will come in handy.

When a radiator first is put into service it should be flushed out with clean water through the screen in the filler tube. In service only clean water should be used, and it always should be put in through the screen. Every two or three weeks the flushing should be repeated.



Sometimes the shop gets in a bent radiator, which can be straightened by a set up as shown here, using pressure from two carpenter's clamps

Cold Weather Lubrication

Stave Off Premature Wear By Supplying the Proper Lubricant

WITH the coming of cold weather, lubricating oils naturally become heavier. To make provision for this characteristic of all lubricants, and provide for better lubrication during the cold months, it is customary to replace the grease and oil in the car with a lighter lubricant.

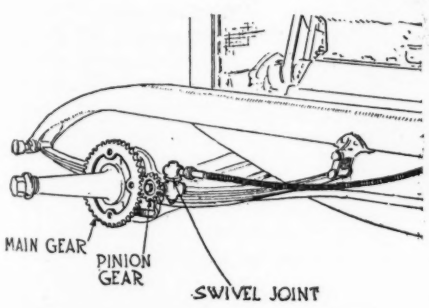
Serious damage may befall a car by not giving attention to the quantity of the lubricants used all through, from engine to transmission and back axle, when cold weather sets in. It is more than possible—quite probable—that something may snap, particularly when the steel has become chilled.

During the cold spell of a short time ago a case was noted where the car owner, a most experienced man at that, was compelled to run his engine half an hour to transmit sufficient heat to soften the grease in the transmission before he could engage the gears. An inexperienced driver would likely have attempted to force the gears into mesh and would have had the trouble and expense of having new gears installed.

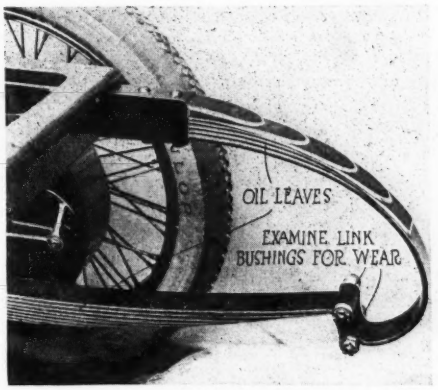
When a car has been standing for several hours in intensely cold weather every particle of grease or oil congeals and becomes extremely heavy, tending to hang on to anything with which it comes in contact. This heavy grease, in the transmission, for instance, will not pass between the teeth of the gears and naturally must act as a clog and a drag.

Add Oil to Lubricating Grease

When cup grease is used in the transmission or differential it is well to add ordinary lubricating oil to thin out that which is already in place. Even 600W will become so heavy it is almost impossible to move the parts and cup grease will set still harder. Besides, there is danger in the heavy grease not finding its way to those parts that need lubrication, for the gears merely will cut a path through the grease, and none will be in a state to fall into the teeth and be carried around, whereas the lighter oil will follow the gears readily and also will gradually thin out the grease to permit it to work satisfactorily.



An often neglected place. Oil it thoroughly



Stop the squeak with oil

Before cold weather has set in part of the heavy grease should be removed and oil substituted, so it will have opportunity to soften the remaining grease and work its way to all oil holes or bearings that otherwise will be neglected and perhaps ruined for lack of lubrication. The driver, of course, will not understand why his bearings or gears or some other parts have been damaged when he knew there was a sufficient supply of grease.

Electric Machine Is Easy to Oil

Oiling the parts of the electrical machines is not a difficult task, because these parts generally need oil once a month. The chief difficulty encountered when oilnig generator parts and starting motor parts is that too much oil may be applied which would cause the commutator to become flooded and the machine consequently inoperative. With a magneto, for example, the oiling holes are covered with caps. These should be lifted and filled, only. The oil can spout must not be forced into the oil hole in the belief that since oil does good wherever it is applied, the oil hole of the magneto should be forcibly flooded.

A battery system should have slightly more attention than a simple magneto installation. The Delco system, for example, has five places which should be lubricated. They are: the grease cup for lubricating the motor clutch, the oiler for lubricating the generator clutch and the forward armature bearing, the oil hole for lubricating the bearings on the rear of the armature shaft, the oil hole in the distributor for lubricating the top bearing of the distributor shaft (this should receive lubrication once a week) and the inside of the distributor head, which should be lubricated with a small amount of vaseline, carefully applied.

When a car is new the distributer should be lubricated two or three times in the first thousand miles. After this no attention need be given the distributer for a burnished surface will have been formed for the rotor brush on the distributer head. After applying the vaseline carefully wipe the head clean with a soft cloth.

Spring shackle bolts are particularly likely to suffer during a cold spell. This is noticeably true where grease cup lubrication is employed. The hardening of the grease and the impregnation of the joint with road dust makes it easy for dust to cut and wear away the parts of the spring system. To determine whether the dust has done this it is best to place a jack under the spring eye and working the handle slowly up and down the play in the joint can easily be determined. If the play is found to be considerable, it is wise to replace the shackle bolts. If the bolts are found to be in good condition, the grease and oil cups should be removed and the passages cleaned out by forcing kerosene through them. A grease gun with a tightly fitting piston is ideal for this purpose.

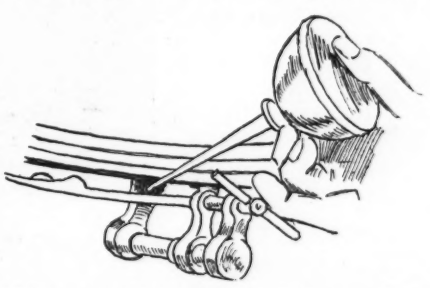
Care for Spring Leaves

The spring leaves should be given some attention. A spring spreader should be used to separate the springs. The type of spreader is not material, but the work can be easily done by applying a jack to the body of the car, thus relieving the springs from the weight of the chassis. Then a sharp-pointed chisel can be forced in between the spring leaves, by hitting the chisel a smart blow with a medium weight hammer. The lubricant for the springs can be made by making a thin paste of old cylinder oil, drained from the engine base, mixed with lubricating graphite. The paste can be forced in with a grease gun or spread over the surface of the spring by using a hacksaw blade.

Watch Speedometer Joint

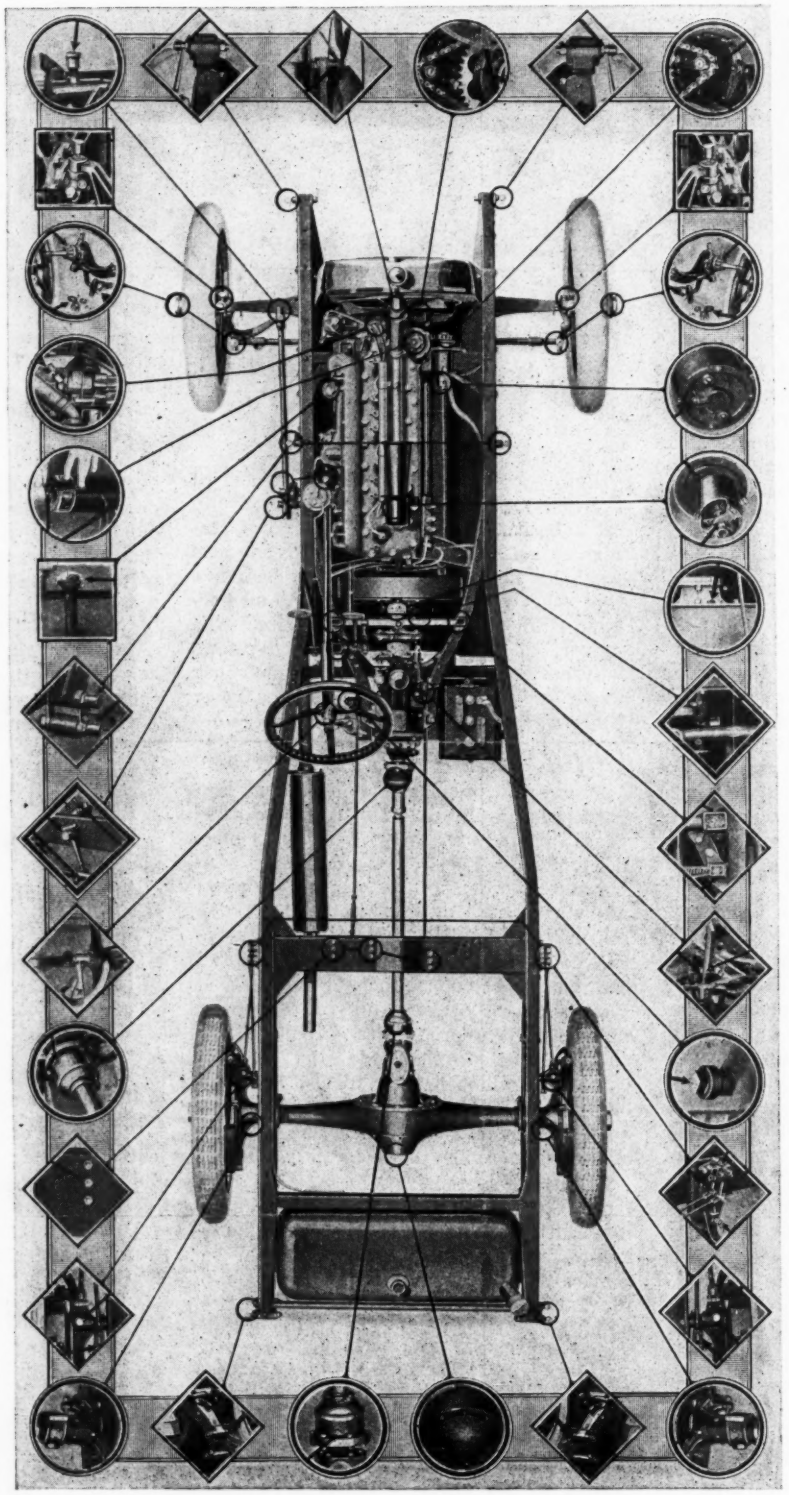
One part of the car frequently neglected is the speedometer joint. This should be given a thorough washing in kerosene and a light grease applied.

A thin mixture of medium oil and graphite serves ideally to lubricate the flexible drive tube for the speedometer.



Using a spring spreader and an oil can to help the spring squeaks

CHASSIS LUBRICATION CHART



Parts indicated in squares call for daily, in diamonds for wee kly and in circles for monthly lubrication

CARBURETING AND LOW MERCURY

Making Starting Easy in Winter Without Draining the Battery

WHEN the car owner brings his car in this winter and politely informs you he is going to drive his car during the cold snap, and after looking over the car you find it is of 1915 vintage, that the carbureter is rather antiquated, that the intake manifold resembles the entrance to the Cretan labyrinth, and that the storage battery is well on in life, and then you connect all these facts with one more, namely, that the fuel we now burn is not gasoline but something "almost as good," what are you going to do?

Are you going to say: "Fine idea, but how are you going to do it with this cart?" or will you explain to the customer what difficulties he will have to contend with, and tell him the changes you recommend in order to get through the winter successfully with the least trouble and the least strain on the starting battery?

There are a number of things that your repair department can do to this man's car to help him out. Some of the changes will perhaps require some expert service salesmanship, but the advantages that can be obtained by the adoption of the recommended changes are many, and the saving in the car operation cost will be noticeable.

Sell Him a New Carbureter

If you can sell him a new carbureter of the new type designed to handle present low grade fuel you will then have made one big step. Then there are a number of hot spot devices, or manifolds, for example, which will aid materially in saving fuel after the engine is started. Most of these hot spot devices serve their purpose after the engine is started and the hot exhaust pipe is able to transmit its heat to the intake gases.

There are a few accessories that help the initial start. The Columbia carbureter, for example, Harris Trust Bldg., Chicago, which was described recently in MOTOR AGE, has a heating coil in the nozzle of the carbureter which vaporizes the fuel and assures an easy start without draining the battery. However, if the engine dates back several years, it is probable the intake manifold is architecturally a beautiful piece of casting work, but in these days when heat is absolutely essential to the carbureting of the fuel, the manifold might better be serving as an anchor to a fishing smack. If your shop is not prepared to supply a new manifold of up-to-date design for this car, fix the old one up. Cut the long entrance pipe off and weld the flange back on, so that the carbureter will be somewhere in the vicinity of the engine.

Primers Will Help

Primers are a great help to assure an easy start when the mercury in the thermometer falls. However, these must be properly installed, for if not, a badly carbonized engine will result. We have in mind an instance where a primer caused a great deal of trouble because it was improperly installed. It seemed that the primer, because of the vibration from the engine, would come loose, and because of this the gasoline was being constantly drawn from the vacuum tank to the primer into the intake manifold without going through the carbureter. This was

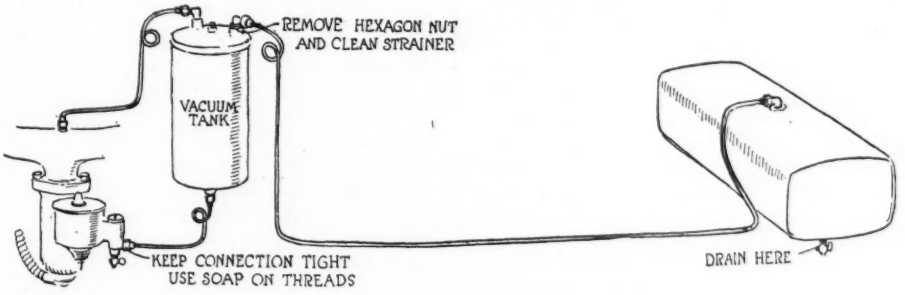


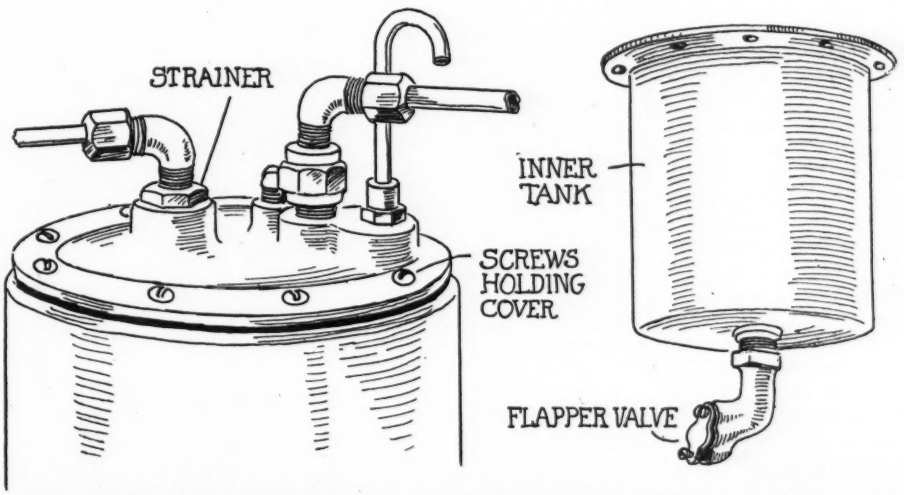
causing an over-rich mixture which carbonized the engine badly.

The gasoline lines should be free from dust and dirt. A season of touring through dusty roads and frequent stops for gasoline is bound to deposit sediment in the tank, and one of the most bothersome jobs in winter is to coax any foreign material out of an obstructed gasoline line.

There have been a number of installations made with a small auxiliary tank which furnishes a mixture of gasoline and ether direct to the carbureter and to the manifold through a primer. The arrangement of one of these systems is best worked out by the ingenuity of the mechanic. The float chamber connection to the bottom of the carbureter from the vacuum tank should be disconnected and this replaced with a three-way valve. By turning the handle of the valve to either of the two positions the fuel can be led to the carbureter from the auxiliary tank or from the vacuum tank. By means of a flexible connection this control can be secured to the dash which will make it unnecessary to open the hood every time it is desired to start the engine.

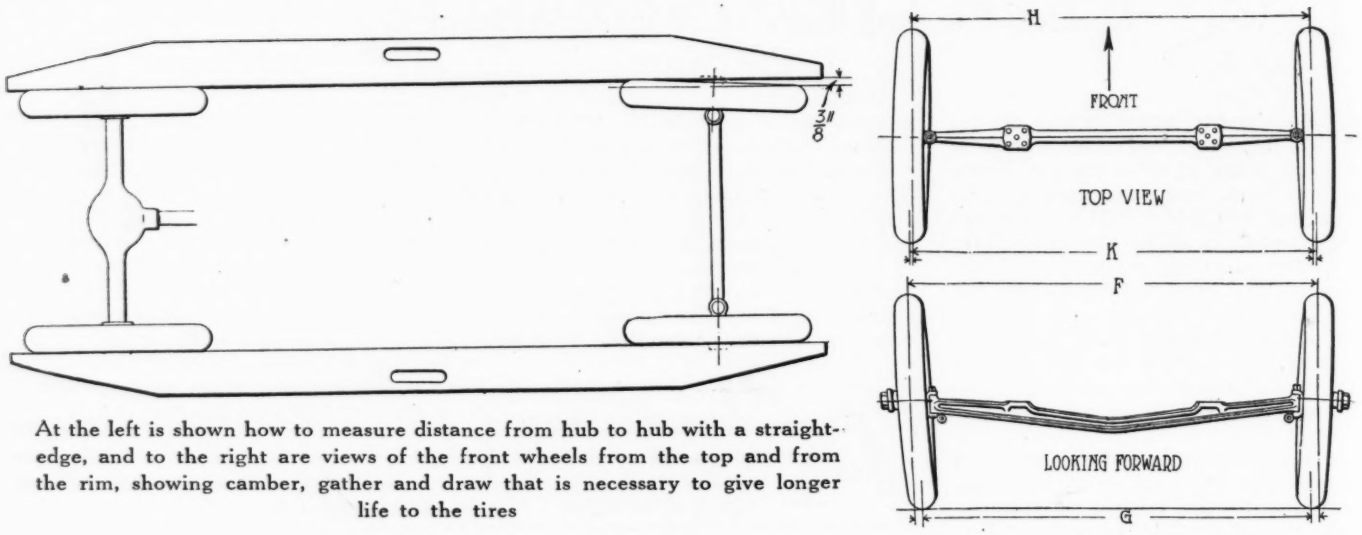
Mechanics somtimes make the mistake of not putting a spiral in the copper tubing leading from the vacuum tank to the intake manifold, or from the bottom of the vacuum tank to the carburetor. A spiral bend is necessary to absorb vibration and prevent the tube from cracking off. The bend should be at least 4 in. in diameter. If they are smaller than this the pipe is not flexible enough. Spirals are especially necessary where the tank is mounted on the dash and not on the engine.





Outline of the gasoline system. The vacuum tank with inner tank removed showing flapper valve

Steering Gear Maintenance



At the left is shown how to measure distance from hub to hub with a straight-edge, and to the right are views of the front wheels from the top and from the rim, showing camber, gather and draw that is necessary to give longer life to the tires

WHEN summer touring is at an end and the time arrives to prepare the car for the winter, be sure the steering gear is in the list of parts to be given attention during the overhaul. Winter driving brings with it the danger incident to slippery roads and traffic conditions made otherwise unbearable because of the cold weather. The steering gear plays a most important part in the driving of the car and it is right that this important part of the car should be given extra careful attention. One of the specially noticeable things about a steering gear after a long drive through bad sandy roads is the wabbling of the front wheels. This is not conducive to tire economy because it indicates that the backlash and the play in the drag link and the other parts of the gear are not in proper adjustment, and the misalignment so caused is likely to produce rapid wear upon the tires. There are, therefore, two reasons at least why the steering gear should come in for its share of attention. One is adding to the safety of the driver and the other is for the purpose of prolonging the life of the tires.

Steering Gear Repairs Are Varied

Varying with the different kinds of steering gears the repairman will find on the car adjustments, one for one type of gear and as many as three for other types of gears. The car brought into the dealer's shop owned by the average professional man is generally more in need of repair than that owned by the average layman who has a natural hankering for mechanics. So, with a little knowledge of the habits and the business of the man who brings the car into the shop, one can easily tell just how much repairing the car is going to need, and one of the best places to look for trouble will be in the steering gear, because the man's natural tendencies and habitual characteristics are best reflected here. A gear which is badly worn and has a lot of play in it when the steering wheel is moved is generally owned by a nervous, impetuous sort of fellow, always in a hurry to get somewhere. Cars owned by this type of individual should have the this type of individual should have the steering gear fixed up in good shape for the cold weather.

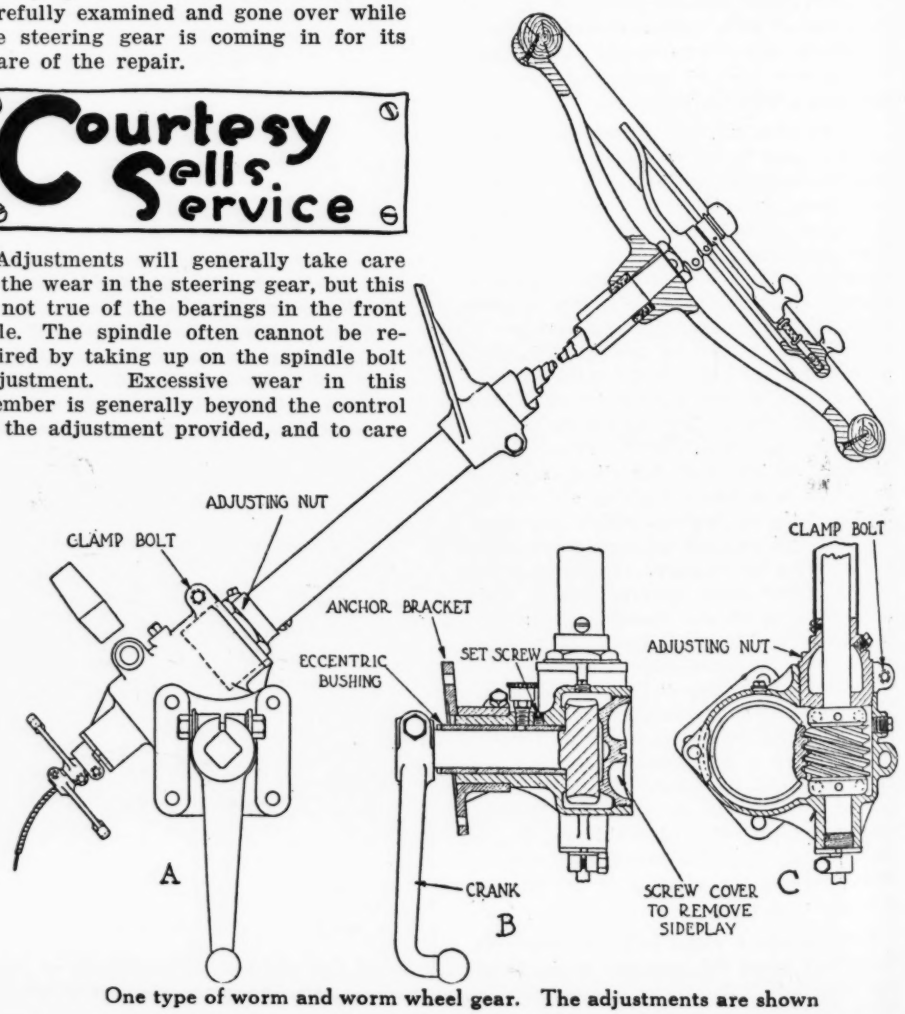
Examine Front Axle Carefully

The front axle is closely associated with the steering gear, and the bearings belonging to the front axle should be carefully examined and gone over while the steering gear is coming in for its share of the repair.

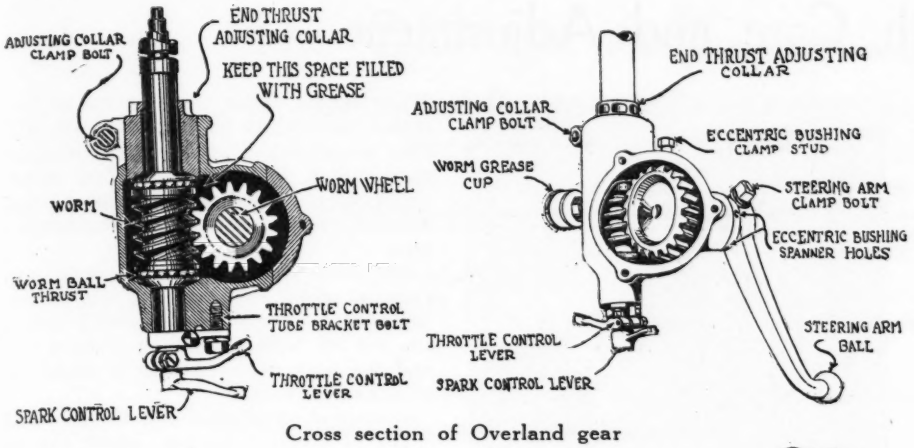
Courtesy Sells Service

Adjustments will generally take care of the wear in the steering gear, but this is not true of the bearings in the front axle. The spindle often cannot be repaired by taking up on the spindle bolt adjustment. Excessive wear in this member is generally beyond the control of the adjustment provided, and to care for this it is many times necessary to fit new bushings to the bearings at the axle spindle bolts.

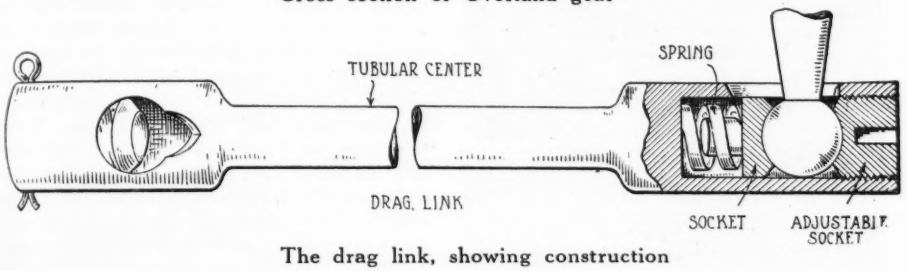
With the average type of steering gear there are two places at which wear may occur. One is between the worm and the worm wheel. This causes an up-and-down motion in the steering wheel and is taken care of by the adjustment nut at



One type of worm and worm wheel gear. The adjustments are shown



Cross section of Overland gear



The drag link, showing construction

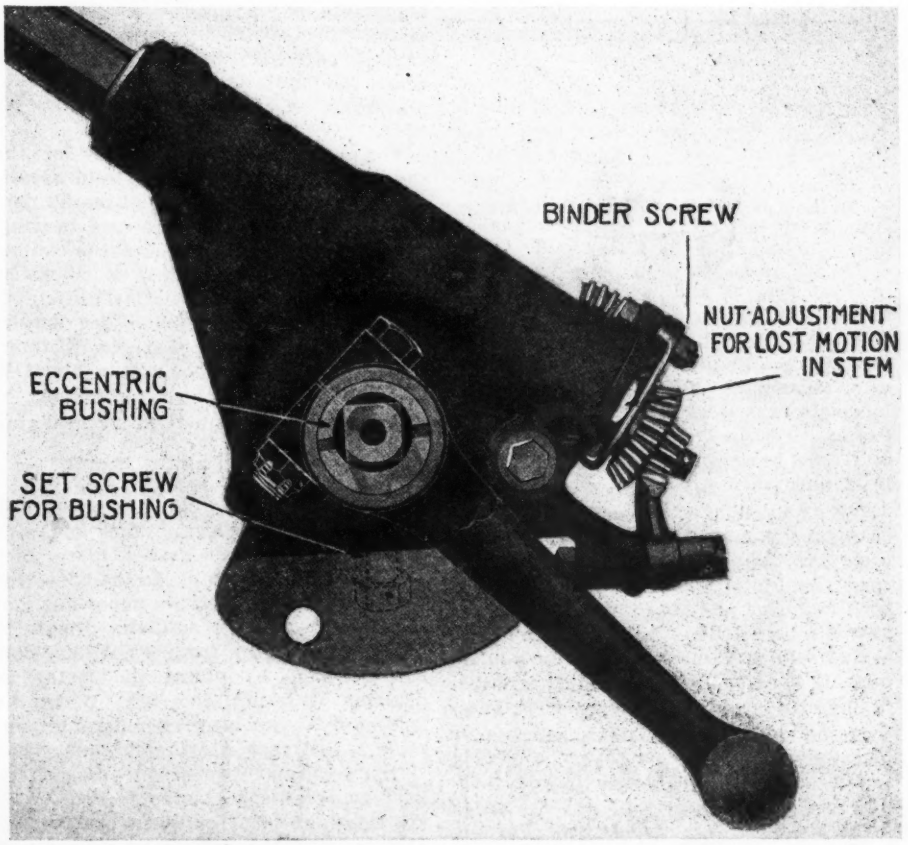
the top of the steering gear housing. The other adjustment is on the worm of the gear, and this is taken care of by turning the eccentric bushing, which moves the worm gearshaft closer into contact with the worm on the steering column. With the first adjustment, turning the collar forces the shoulder on the column closer to the thrust bearing, as the illustration shows. With the second adjustment, that of the eccentric bushing, one will find holes or slots in the eccentric bushing. This should be turned up after the clamping device has been loosened. If this does not take up the play there is still another remedy.

The steering gear should be removed by disconnecting all the sparks and throttle controls, dash-bracket, etc. Then take off the steering arm and turn the wheel so the shaft will make a quarter turn. This operation brings a new surface of the worm and wheel into engagement and takes up the play. The eccentric bushing should be turned back, so it can be used to take up the play in the usual manner after the steering arm has been changed. Of course, after the gear has been adjusted in this manner, it should be repacked with grease, and oil cups, etc., refilled. Always when making adjustments on the steering gear have the wheels locked over either to the right or left, as far as they will go. The drag link which connects the ball-arm with the steering-arm of the spindle should be taken off and the inside cleaned out. Adjustment for this is made by screwing the slotted nut either in or out and then replacing the cotter pin. If there is considerable play in the steering spindle, the bushings should be renewed and in some cases the pin itself replaced. Always cover the surface well with oil when replacing, as when new parts are fitted there is little space between the walls, and it generally takes the oil some time to get to these parts.

While this work is being done on the steering gear the front axle can be very well taken care of. The hub cap should be removed and the bearings taken off the steering knuckle, cleaned in kerosene and examined. Very often it is found that when the wheels have become wobbly, due to excessive wear in the drag link and its parts, the bearings will pound themselves to pieces, or else they will become cracked. When the raceway for the bearing is forced back into the cup in the wheel, great care should be exercised to see that it is in no way pinched or sprung. This is one of the most easily injured parts on a car, for if these raceways are not placed in the wheels properly they will surely crack, and this allows the bearings to wear themselves out and pound themselves to pieces every time they make a revolution when coming into contact with the crack in the raceway.

PROPER CAMBER AND TOE-IN

CAR	TOE-IN F-G	CAMBER K-H
Abbott-Detroit	½ in.	
Buick D-44-45—		
32 by 4 wheel	3/8 to ½ in.	1 3/8 in.
34 by 4 wheel	3/8 to ½ in.	1 ½ in.
Buick D-55	3/8 to ½ in.	1 9/16 in.
Buick D-55	3/8 to ½ in.	1 7/16 in.
Cadillac	3/8 in.	1 ½ in.
Chalmers	1/8 to 3/16 in.	2 deg.
Chandler	¼ to 3/8 in.	
Cole	3/8 to ½ in.	
Dodge	½ in.	
Dort	¼ to 3/8 in.	2 deg.
Ford	0 to ¼ in.	3 deg.
Franklin	0 to ¼ in.	
Glide	3/16 in.	
Grant	3/8 to ½ in.	
Haynes	5/16 in.	
Hudson	5/16 to 3/8 in.	
Hupmobile	¼ in.	
Jackson	3/8 in.	
Jeffery	3/8 in.	
King	¼ to 3/8 in.	2 ½ deg.
Locomobile	3/8 in.	
Marion	5/16 to 3/8 in.	
Maxwell	3/8 in.	15/16 in.
Mitchell	3/8 in.	1 ¾ in.
Moon	5/16 in.	
Overland	3/8 in.	
Packard	1118 to 3/16 in.	
Paige-Detroit—		
34 by 4 wire	3/8 in.	5 deg.
32 by 4 wire	5/16 in.	5 deg.
Peerless	3/8 in.	2 deg.
Pilot	3/8 in.	
Saxon	½ in.	
Wescott	5/16 to 3/8 in.	



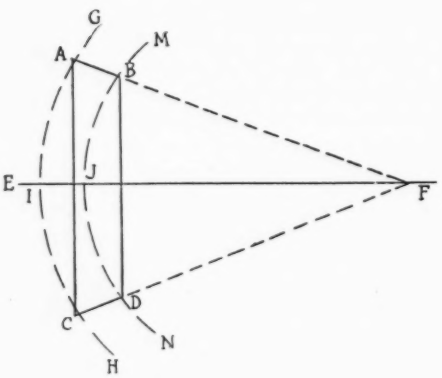
A type of gear with the adjustment at the bottom of the housing

Clutch Care and Adjustment

A CLUTCH which engages smoothly and is entirely free from jerking is an important factor in the operation of a motor car. It minimizes the strains and stresses on the gearset and rear axle. A considerable portion of the troubles in these units can be attributed to the sudden excessive loads thrown upon them in starting a car from rest by a poor acting clutch.

Two types of clutch are in general use, the multiple disc and the cone. The multiple disc is used by the majority of manufacturers. The dry-disc type requires but little care in so far as the clutch proper is concerned. As this type of clutch wears, the adjustment of the clutch pedal must at all times be free so that it does not strike the floor boards and thus hold the clutch practically released. This will cause slipping and result in the contact faces of the plates being burned. Once these faces become glazed it is almost impossible to remove this condition.

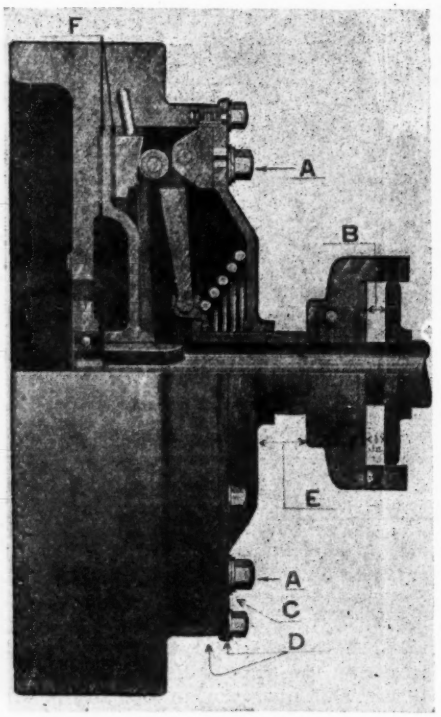
Lubrication of the clutch release bearing is important. This bearing carries the load when the clutch is released and



Method of laying out leather facing for a cone clutch

in most designs is lubricated by a flexible tube extending outside of the clutch housing and attached to a pressure grease cup. In some designs it is necessary to remove the inspection plate to lubricate this bearing, and as through neglect this is a frequent source of trouble. This bearing should be lubricated at least once each week.

The wet type of clutch usually consists of metal-to-metal plates running in an oil bath. If this type of clutch slips, the case should be washed out thoroughly with kerosene and the case filled with a new oil bath. This bath is either the ordinary form of lubricating oil or a mixture of kerosene. This bath should be prepared in accordance with the instruc-



Points of adjustment on the Borg & Beck clutch

tions given in the manufacturer's reference book.

Clutches Are Readily Adjustable

Some of the multiple-disc clutches are adjustable by varying the tension on the clutch spring. These adjustments are usually necessary after a new car has run a few hundred miles due to the fabric lining wearing the high spots off of it.

The plate clutch is usually of the three-plate type and is simple in adjustment. It runs dry and requires no care except to lubricate the release bearing. To adjust the clutch, loosen these two set screws and move them in a clockwise direction along the slot after the clutch has been released. These set screws should be so placed that the distance from the end of the slot will be about ½ in. This will give the clutch plenty of repease and prevent it from dragging when it is released.

Two Types of Cone Clutches

Two types of cone clutches are in use. One type uses the leather face and runs dry, while the other uses a fabric face and runs in an oil bath. In the cone type with the leather face it is important that the leather be kept soft and pliable to prevent the clutch from grabbing. This can be done by giving the leather a dressing with neatsfoot oil. When the leather dries out after considerable running it becomes hard and causes the clutch to grab. Castor oil also can be used to soften the leather. Practically all types of cone clutches are adjustable to prevent slipping by a series of spring inserts around the clutch spider. When taking up on these spring adjustments one should be careful to see that they are all taken up evenly. A slipping cone clutch with a leather face sometimes can be remedied by placing a small amount of fuller's earth on the contact face.

The cone clutch with the fabric face runs in an oil bath and has similar adjustment. If this type of clutch grabs, the old oil bath should be drained out and the bath replaced with a supply of clean oil.

A method of determining the size and shape of a clutch leather, which can be resorted to when no clutch leather is available and it is necessary to make a new one, is described by the following, shown herewith. It is first necessary to dissemble and remove clutch. Next measure the front and rear diameter and the width of the clutch cone and make an accurate full-sized drawing of it on paper. Then through the center of the cone draw the center line EF and extend the lines AB and CD until they intersect the center line EF. Using AF and BF as radii, describe the semi-circles AIC and BJD. The space inclosed by these semi-circles represents the shape of half of the clutch leather. This pattern can be reversed and used to lay out the entire leather, which should be cut in one piece and about 1 in. longer than is necessary to take care of any irregularities in fitting the leather to the cone.

Before attaching the leather to the cone it should be softened by being soaked in castor oil for several hours. This treatment will render the attaching of the leather much easier and will insure a smooth acting clutch. If a clutch leather is mounted without first being softened it generally will be harsh in action and must be placed in a lathe to be trued up, whereas if the leather is pliable it will seat to the form of the cone without trouble.

One of the best methods to attach a clutch leather is to start at one end of the leather, drill the holes for the rivets and rivet it to the face of the cone. Then stretch the leather to the next set of holes, attach it at this point and continue around the face of the cone until the leather is mounted. During the mounting process care should be taken to see that the rivets are countersunk properly. The rough side of the leather should be the contact surface.

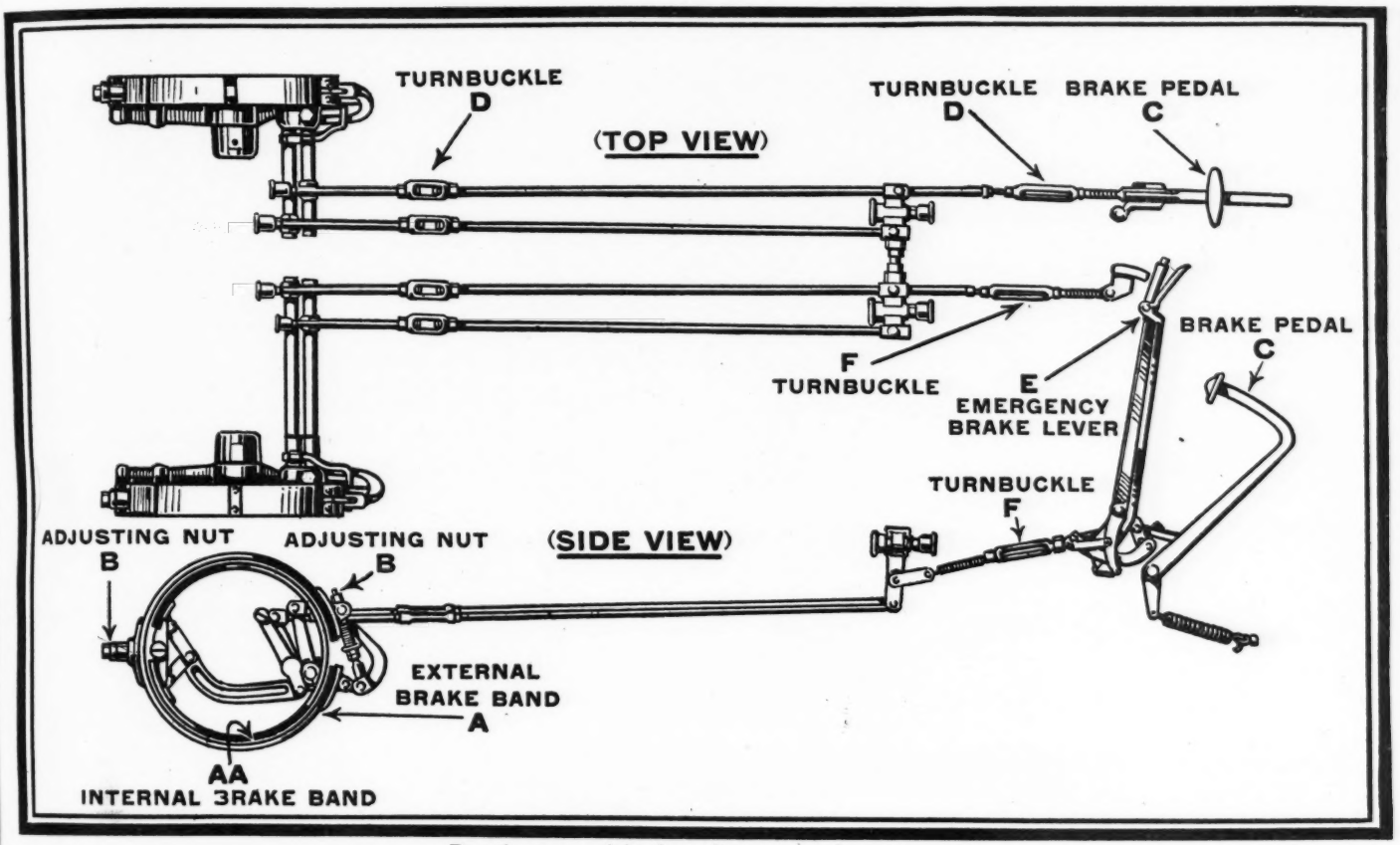
The presence of ordinary lubricating oil on the face of a clutch will cause it to slip even though the leather may otherwise be in good condition. This can be remedied by the application of paraffin or fuller's earth to the face of the clutch leather.

Clean Cars Sell Service

Efficiency Sells Service

The Care and Adjustment of Brakes

Details of Processes Necessary to Keep This Important Part in Good Condition



Detail views of brake adjustment of motor car

INSPECTING BRAKES

1—Inspect the lining on the external brake *A*. If it is less than 1/16 or 3/32 in. thick, it should be removed and replaced.

2—If lining is still of ample thickness for further use, see if there is too much clearance around the drum. If so, tighten the adjusting nuts *B* provided for the purpose.

3—If the car does not stop at the required distance after adjusting the brake bands, make certain the brake pedal *C* is not striking the floorboards when pushed down. If it is, shorten the brake rods or cables by the turnbuckle *D* or other adjustment provided for this purpose.

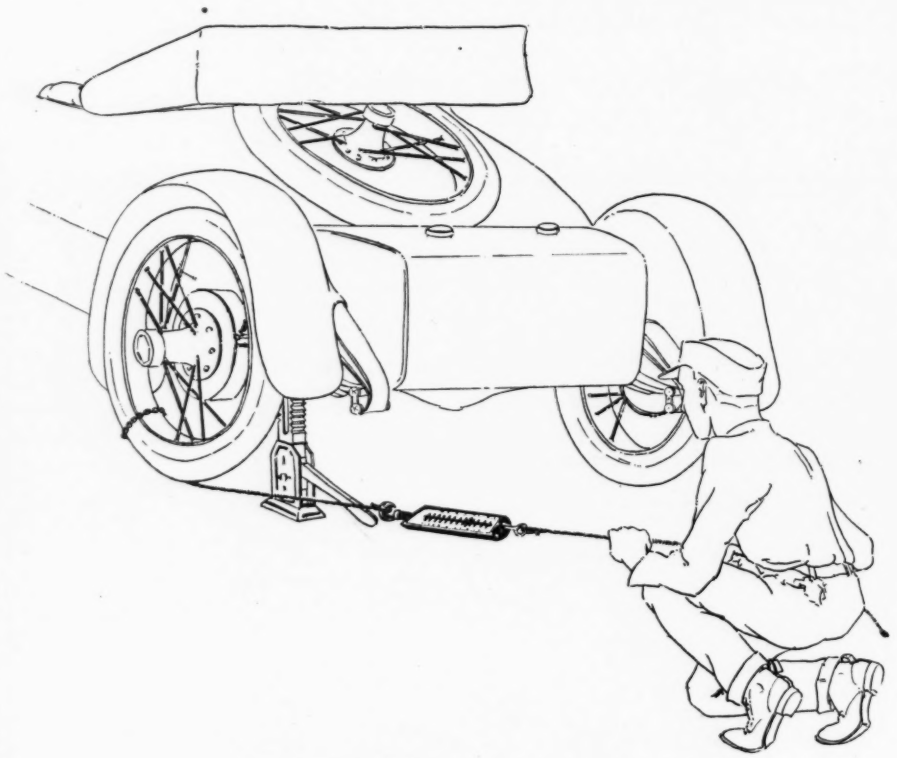
4—Make certain the emergency brake *E* does not strike the end of the ratchet or the floorboards before a good pull is obtained. If it does, tighten the turnbuckle *F* or make the adjustment on the rear turnbuckle. If the brake will not hold after the adjustment, inspect the surface of the brakes. If grease has worked through the packing of the hubs to the lining, scrape the lining thoroughly and tighten or renew the packing in the hub.

1—Inspect external brake.
2—Inspect for clearance on drum.
3—See that brake pedal does not strike floorboards.
4—(a) See that emergency brake does not strike floorboards.
(b) Inspect surface of brake lining for oil, etc.
5—Inspect brake lining for uniform pressure.
6—Equalize adjustment of brakes.
7—Road test.

5—After brake lining has been attached, the bands should be adjusted to permit a uniform pressure on both the service and emergency brakes. Be certain the bands are neither too tight nor too loose. If too tight, the brakes will drag and the hubs will become hot. If too loose, the brakes will not take hold and the car will be unsafe for use. Enough clearance should be allowed so the brake bands are free when the car is loaded or traveling over rough roads. Under either of these conditions, the axle moves slightly backward, pulling on the brake rods, which has a tendency to tighten the brakes if they are not properly adjusted.

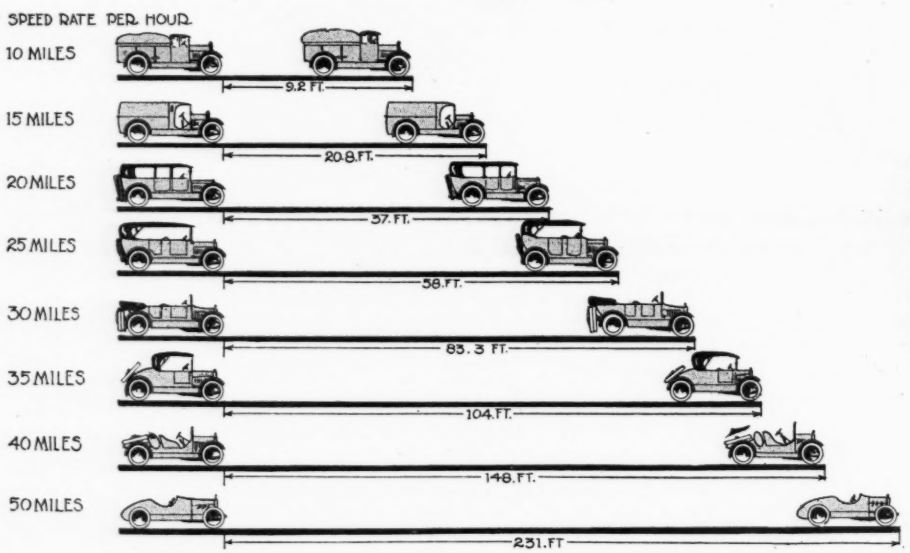
6—After the brakes have been adjusted jack up both rear wheels. Apply the service brake and turn the wheels by hand to make certain the adjustment is equal on both wheels. Do the same on the emergency brakes. This is most important as an unequal adjustment will cause the car to swerve and skid.

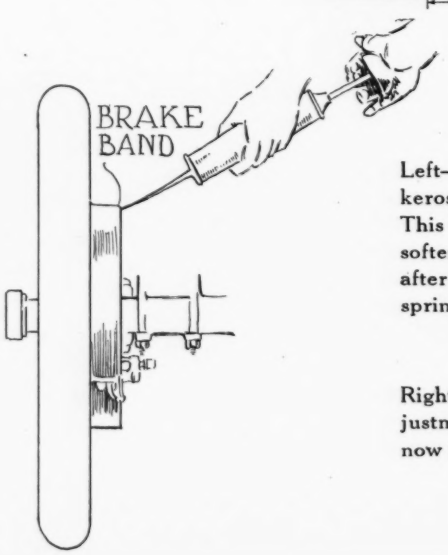
An Attractive Front Sells Service



To be sure that brakes are accurately adjusted, a chain or line should be secured around the tire and a spoke, the free end being long enough to connect to a spring balance or a scale as the illustration shows. Then, by setting the brake lever at a half way position, the wheel can be turned by pulling on the spring balance and observing the pull required to turn the wheel at a steady rate. Then perform the same operation on the other wheel and if the brakes are adjusted correctly the pull on the balance will be the same in both cases

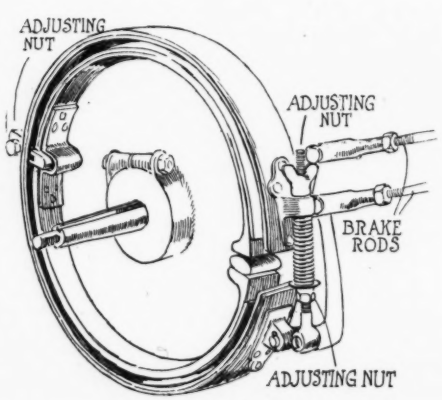
After the adjustment of the brake is made the car should stop within the distances shown on this chart. This applies to all types of vehicles, whether trucks, or passenger cars





Left—Use a grease gun and force kerosene into the lining and drum. This will clean out the grease and soften the brake lining material. If, after this operation, the brakes slip, sprinkle a small amount of Fullers Earth on the material

Right—These places are the adjustments on the majority of brakes now in use. See that they are properly adjusted



REAR AXLE CARE AND ADJUSTMENT

Methods of Overhauling to Eliminate Noises and Trouble are Outlined

REAR AXLES seldom require adjustment, except in cases where some part wears more rapidly than it should or where the wear is the result of constant use. Rear axles, regardless of type, can be adjusted to eliminate the noises produced by wear. With all axles the principle of adjustment is that of moving the carrier for the ring gear closer to or farther away from the pinion gear. The other adjustment provides for the wear of the pinion gear and this moves the pinion away from or toward the rear axle.

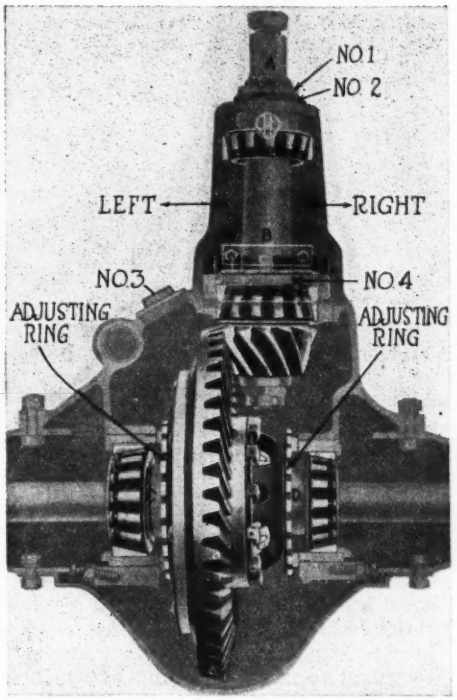
Almost every set of driving gears, however quiet it may be, has a pritical period at which the gears are noisier than at any other speed throughout the range of the car. This is due to the fact that it is practically impossible to mount a set of gears so it will run absolutely true. There are three general types of noises that are characteristic of different settings of driving gears. These are: noisy on acceleration or pickup, noisy on steady drive and noisy on coasting. The first case of a noisy set of gears on accelerating the car is usually due to the gears meshing too tightly or too deeply. Some sets of gears when too tightly adjusted will produce a steady noise when the car is moving at a constant speed. This is due in most cases to the differential carrier not having sufficient side play or too tight to have a floating action. Gears which are adjusted with too much slack between the teeth will produce a noise when the car is coasting.

Cause of "Out of Round" Sound

If the gear mounted on the differential carrier does not run true it will produce what is known as an out of round sound when the car is running on the road. This will be noticed by an intermittent growl which will occur every time the high spot on the gear comes into contact with the pinion. This condition may be due to a broken bearing, an improperly machined gear or the gear having become loose on its mounting on the differential carrier assembly.

With these facts in mind regarding the sound characteristics of gears in various phases of adjustment, it would be possible by means of a road test to estimate what work would be necessary toward lessening the noise evil. It is only by road tests that one can determine the accuracy of the adjustment. Excessive side play in the differential carrier can be determined sometimes by rounding a corner and throwing the large gear in against the drive pinion. If there is any side play present in the assembly it can be heard distinctly when the meshing of the two driving gears deepens.

Some of the customary forms of rear axels are shown in the illustrations. These axles exemplify the various forms of adjustments that prevail in actual practice. The illustration shows a design of an axle in which it is possible to adjust the pinion and gear so the teeth may be meshed correctly and the adjusting nuts locked securely to prevent loss of the adjustment. After several thousand miles of service it is frequently found necessary to readjust the pinion shaft and differential carrier bearings, due to the fact that they have become more permanently seated.

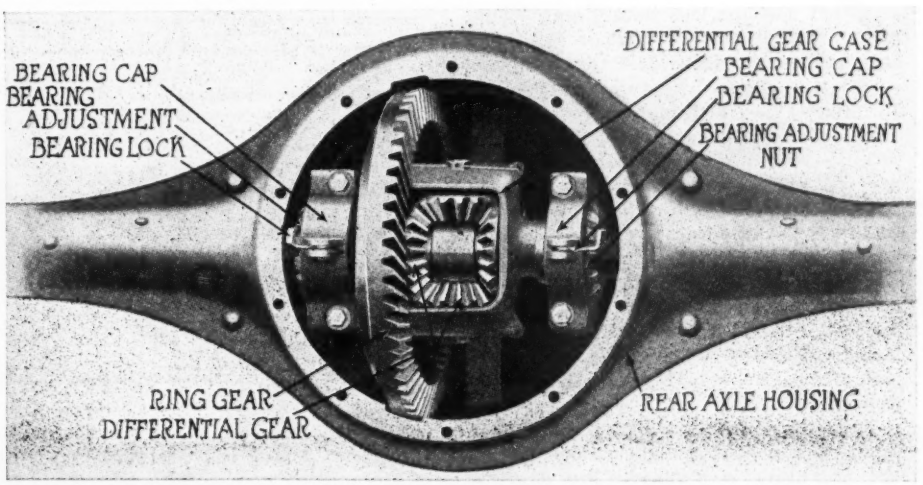


Adjustment of driving ring gear and pinion

If any end play exists in the pinion shaft the pinion shaft bearing nearest the pinion may be adjusted to remove the end play. This can be done by removing the clamp and locking device at the inner sleeve and turning up the outer sleeve. Care should be taken not to make the roller too tight. They should be adjusted so a very slight amount of play or looseness can be noticed. This type of bearing will revolve even if it is too tight and if this type of bearing is permitted to be in service when it is adjusted in this manner the result will be disastrous.

Then to examine the adjustment of the large gear remove the cover plate to the rear axle housing. Now test the differential carrier for side play by inserting a small bar on either side of the gear and move the differential carrier assembly sideways to see if any end play exists. There should be sufficient end play to permit the assembly to float in the bearings, but if the motion is excessive and allows the assembly to drop down out of its working axis the bearings will have to be taken up. This can be done by removing the locking device and taking up on the adjusting nut on the left side of the gear, being careful not to set the bearing too tight.

The teeth of the pinion and gear should be flush with each other at the large ends, and if it is necessary to move the pinion in or out to have the teeth match correctly, this can be done by moving both of the pinion shaft adjusting nuts simultaneously and avoiding disturbing the bearing adjustment. After the teeth are brought flush at the large ends, it may be necessary to move the gear to one side or the other to secure the proper play between the teeth. This can be done by moving the bearing cases on either side of the differential carrier in the proper direction. When completing the work be careful not to make the adjustment of the bearings too tight. The gears should be set so that they run freely and do not bind at any point. After completing the adjustment be certain that all locking devices are securely replaced. The amount of back lash between the pinion and gear should be from 0.006 to 0.008 in.



Rear axle with differential case cover removed to show adjustments

THE ELECTRIC SYSTEM—ITS CARE

DOES the electrical system of a car need any special attention during the cold weather? The answer to this quesiton is most emphatically yes, and after a little thought the reasons become apparent.

During the cold weather, when the oil films between the engine bearings become stiff and the adhesion correspondingly greater, the power required to turn the engine increases as does the flow of current from the battery during the starting period. If a large capacity ammeter were cut into the circuit between the starting motor and the battery, a reading of 400 amp. would be approached at the initial moment of starting. If the battery is discharged at an average rate of 250 amp. during the length of the starting period, say 30 sec., a modest estimate, the total discharge would be 750 watt min. To replace these 750 watt min. the engine of the car must be run sufficiently long to allow the generator to perform its duties.

More Night Driving in Winter

If the normal charge rate is 12 amp. at ordinary driving speeds, the generator must run exactly 10.4 min. This calculation does not even consider the loss due to the heating of the battery during

Prompt Repairs Sell Service

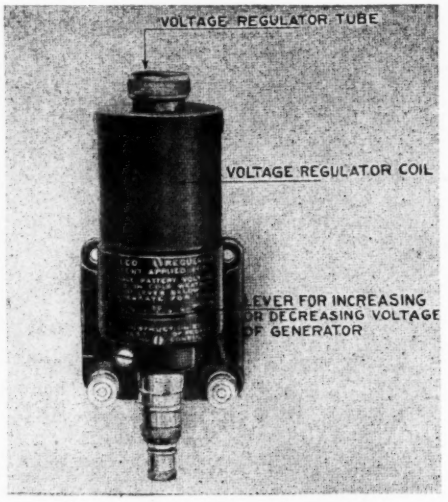
discharge and charge, which means that the generator would have run longer than the estimated time to make up for this loss in efficiency.

Now there is one important consideration which interferes with the estimation. During the winter one's driving is done proportionately more in the night time because the days are shorter and the nights longer. The average speed is reduced so that after all these things are considered it will be found that the charging rate of the generator is not 12 amp. but perhaps less than 6 amp. This means that the engine must be run twice as long in order to replace that which is removed from the battery starting.

Different Types of Generators

In order to increase the charge rate of any generator on any car it is necessary to know only a few general principles, the principles which govern the regulation of generator voltage. In general it might be said that today there are only two types of generators in common use; those with third brush regulation and those with external regulation. There is a third type, the differtial generator, but this has no regulation.

With the third brush type regulation is an easy matter, and the reason behind the operation is simple. The illustration shows a typical third brush installation. The voltage across the brushes is terminal voltage, 6 or 12, as the case may be, and that between the main brush farthest away from the intermediate or third brush, and this third brush is something less, depending upon the position of the brush. Armature reaction is a technical term the meaning of which is simply that the field flux of the generator tends to crawl around the pole pieces in the direction of rotation, from which it is apparent that the farther around this armature reaction makes the field flux displace itself the less will be voltage produced on the other side of the main brush.



Typical Charge Regulator

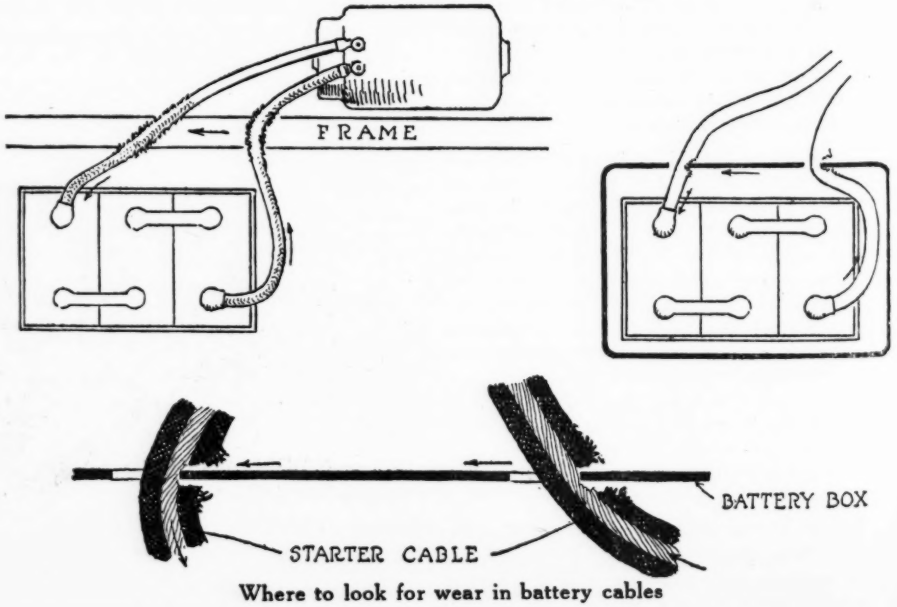
The speed and load of the armature are factors which make this field flux displacement possible. By placing this third brush on the side of the main brush that the flux tends to creep away from a form of regulation can be had. It is easy to see that moving the third brush closer to the main brush, the nearest brush in the direction of rotation, the voltage at the

TABLE OF SULPHURIC-ACID SOLUTION

Parts water to 1 part acid

Specific gravey of soluton (70 deg. Fahr.)....	By volume	By weight	Percentage of sulphuric acid in solution.....
1.100	9.8	5.4	14.65
1.110	8.8	4.84	16.0
1.120	8.0	4.4	17.4
1.130	7.28	3.98	18.8
1.140	6.68	3.63	20.1
1.150	6.15	3.35	21.4
1.160	5.7	3.11	22.7
1.170	5.3	2.9	24.0
1.180	4.95	2.7	25.2
1.190	4.62	2.52	26.5
1.200	4.33	2.36	27.7
1.210	4.07	2.22	29.0
1.220	3.84	2.09	30.2
1.230	3.6	1.97	31.4
1.240	3.4	1.86	32.5
1.250	3.22	1.76	33.7
1.260	3.05	1.66	35.0
1.270	2.9	1.57	36.1
1.280	2.75	1.49	37.3
1.290	2.6	1.41	38.5
1.300	2.47	1.34	39.65
1.320	2.24	1.22	42.0
1.340	2.04	1.11	44.1
1.360	1.86	1.01	46.3
1.380	1.7	0.92	48.4
1.400	1.56	0.84	50.5
1.500	1.0	0.55	60.15
1.600	0.639	0.348	69.12
1.700	0.369	0.201	77.6
1.800	0.1192	0.0646	87.5
1.835	0.0	0.0	93.19

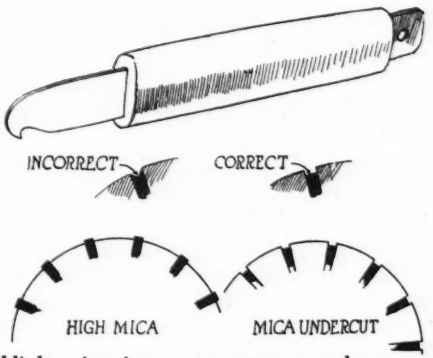
This table gives the proportions of acid to water that should be mixed to obtain various degrees of acid concentration for the battery solution.



Where to look for wear in battery cables

generator will be increased. This should be done with this form of generator.

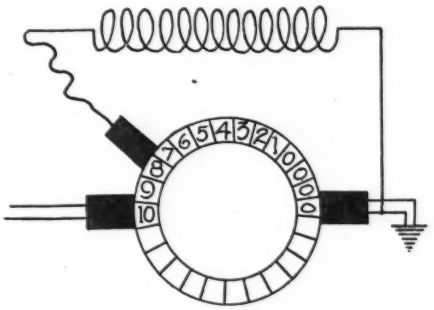
The other type of generators have what is known as external regulation. With this type a regular shunt field generator is used and in the series with shunt field is placed a resistance that varies itself. That is when the voltage of the generator rises to an excess, the resistance which is at that time external to the circuit, is cut in in series with the field. The effect of this is to reduce the generator voltage. As soon as this reduction has reached a point where the magnetism in the coil will not hold the contacts together the resistance is cut out of the shunt field line and the voltage then builds up again. And in this way the cycle just described is again repeated. The repetition of this cycle is extremely rapid, occurring as many as 60 or more times a second. The way to increase the charging rate on a system of this type is to make the field circuit have this resistance in series with it a shorter period of the total time. This



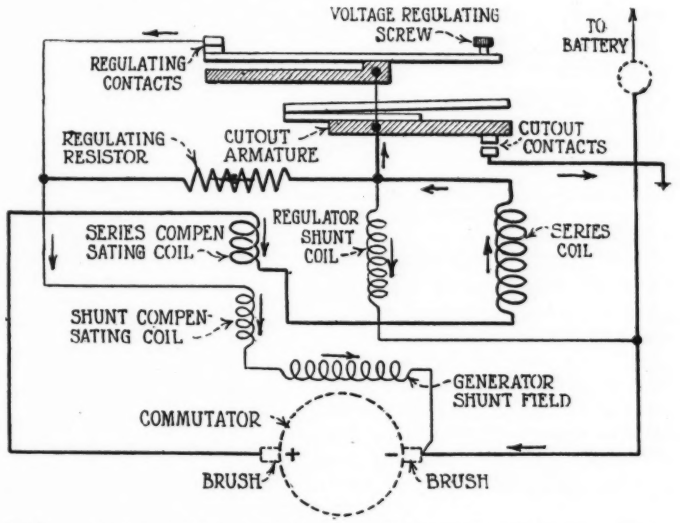
High mica in a commutator and correct and incorrect methods of remedying it. Above, the tool to use

is done by increasing the tension on the spring which holds the regulating contacts apart. The illustration shows the Westinghouse regulator and the screw which is turned to adjust the current charge rate.

With the differential regulator there is no adjustment and these should be given a thorough cleaning, the mica in the armature undercut and the brushes properly sanded to insure proper contact with the commutator. We said there was no adjustment on these generators, and this is true; but it is possible to increase the rate slightly by making a change in the position of the brush assembly. The brushes are set in what is known as brush bus, or retaining ring. On some of these generators it is possible to shift this ring around slightly which will increase or decrease the charging rate, depending upon the direction of rotation. This proceedure should not be carried too far, because the brushes are apt to spark excessively and this will heat the armature and cause the brush to burn out.

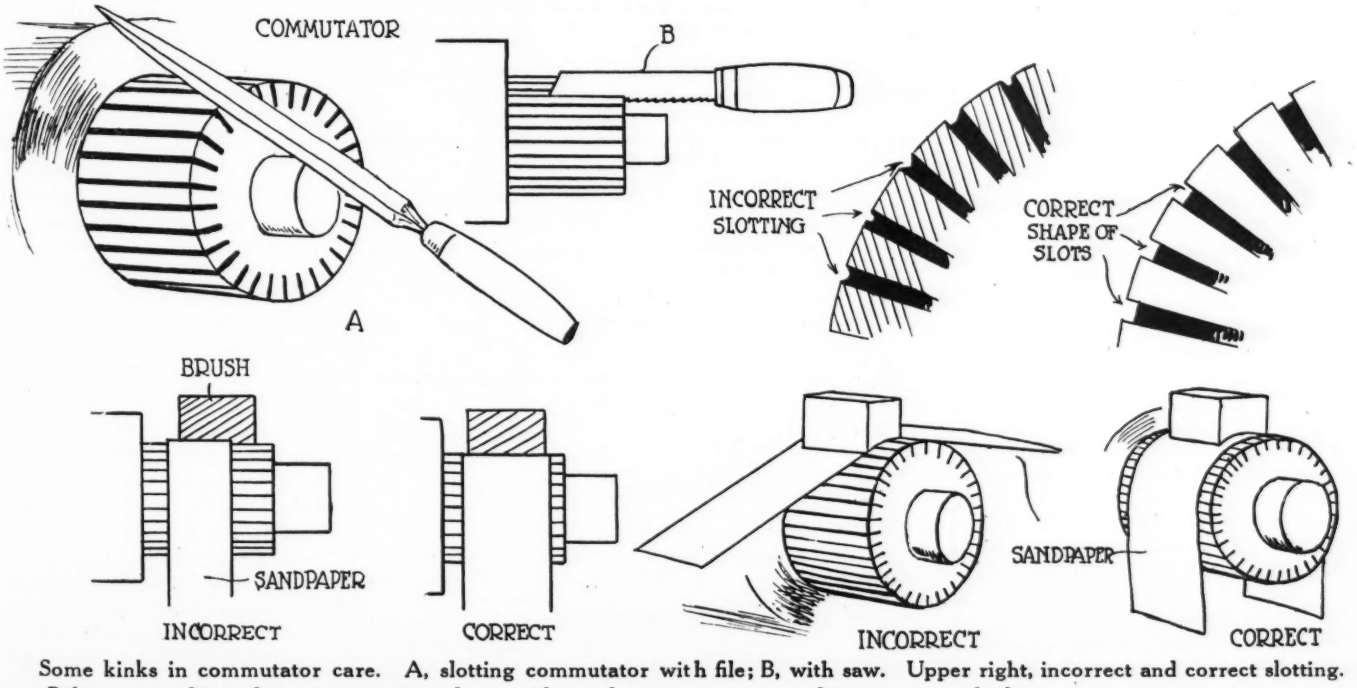


Third Brush Regulation



Typical generator wiring showing regulator and cutout connections

While going over the generator be sure the battery cables are in good condition. Remove the sulphated scale and clean up the surface of the terminals with sandpaper. Then after good contacts are made on all the terminals, paint the terminals with melted paraffin, using a stiff brush to insure that every part of the terminal surface will be thoroughly coated.



Some kinks in commutator care. A, slotting commutator with file; B, with saw. Upper right, incorrect and correct slotting. Below, smoothing down commutator bars with sandpaper— correct and incorrect methods.

SHOOTING ELECTRICAL TROUBLES

Part IV—How to Read Wiring Diagrams

How quickly and accurately the "bugs" in starting, lighting and ignition systems are found and remedied often determines the reputation of a service station or repair shop and sometimes that of the dealer's whole establishment. In this series of articles, which began Oct. 16, are given rapid and easy methods for finding and fixing the common electrical troubles which form a large proportion of the service work. The first article of the series, which appeared Oct. 16, gave the layout of the simple testing tools required for this sort of work. On Oct. 23 was given the method of testing out complete circuits. Last week's article detailed the secret of good connection. Next week Motor Age will give a few hints on the proper care of generators and starting motors.

As a great deal of winter overhauling and service work must necessarily take in the repair and maintenance of electric systems on motor cars, the service man should have a thorough knowledge of the systems on the various cars. MOTOR AGE has published a series of diagrams of the various wiring systems on various models, but it has come to our attention that all our readers are not well enough versed in electrical repair work to get the greatest benefits from these. This article will give such readers a thorough understanding of how the diagrams are to be used in locating the troubles.

ALL manufacturers of electrical equipment supply wiring diagrams which show the proper connections of their apparatus. Such wiring diagrams often permit a circuit to be traced much more easily than is possible if the actual wires on the car have to be followed through. Consequently the ability to read a wiring diagram is essential in locating troubles in circuits.

Certain conventional symbols have come to be used almost universally in wiring diagrams to represent the different pieces of apparatus and their connections. These are shorthand pictures of the thing represented. They are not all standard, but some of them, such as the symbols for the ground connection and the battery, are standard. Lamps, for instance, may be represented by a circle, a bulb, or the complete lamp assembly.

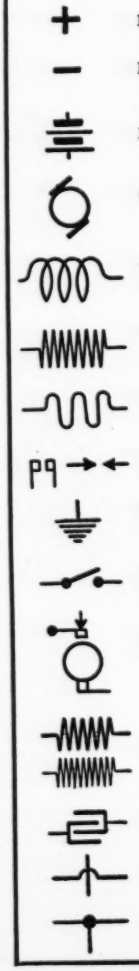
The more usual symbols are illustrated on this page.

A Typical Installation

Before taking up the individual systems we will take up an assumed system which is typical of all the common installations on modern cars. In this, illustrated in Figs. 1, 2 and 3, the sidelights are incorporated with the headlights, there being two bulbs in each headlight, one low candlepower and one high candlepower. Lights and horn are connected through a main switch on the cowl.

Some means of connecting and disconnecting the generator and battery is provided in the majority of cases to prevent a discharge of the batteries through the generator when the voltage of the generator is lower than the voltage of the battery.

COMMON WIRING SYMBOLS



Positive.

Negative.

Battery, either storage or dry cells.

Generator, Commutator and Brushes.

The proper method of showing a coil which surrounds an iron core but very seldom used on Delco Drawings.

The method used in showing a coil where there is no chance of confusion—Used in field coils, ignition coils, etc.

The method used to show resistance such as a resistance unit and charging resistances.

Contact points such as in switches, distributors, etc.

Ground connection where the wire is connected to the chassis, engine or generator.

Method used to show lighting switches.

Motor Commutator and brushes with brush lifting switch.

Primary and secondary windings of an ignition coil.

Condenser.

Crossed wires not connected.

Connection in the wiring.

This device is called a cut-out and it has been omitted from the diagrams, for the sake of greater clearness.

Tracing the Circuit

The generator in this case is connected to the engine shaft by a silent chain, and the circuit through which the generator sends the charging current for the storage battery may be traced in Figs. 1, 2 or 3, as follows: Starting with the ground connection G, you follow along the wire 1, through the generator along wire 2, through the ammeter, along wire 6 to junction point 7, then along wire 8 to the battery, through the battery and along wire 9 to the frame of the car, which is the same as the ground connection G1, from which you started, since all indicated ground connections are in reality connections to the frame, and in such cases the electrical circuit is completed through the chassis.

It sometimes is difficult to determine from a wiring diagram or from the wires themselves on a car just which of two or more wires at a junction are taking the current. This always can be ascertained by remembering that current will flow only where there is a complete circuit; for instance, in the circuit just mentioned all the switches are open, except the connection between the generator and battery, and that therefore is the only complete circuit. Consequently when we come to the junction of the two wires at the ammeter we know that no current is going up on wire 4 to terminal 26 on the cowl switch because this switch is open, and the horn button and the cowl light switch 33 are open so that there is no connection to any circuits out of the switch. Likewise when we come to junction 7 we know that all the current must pass down

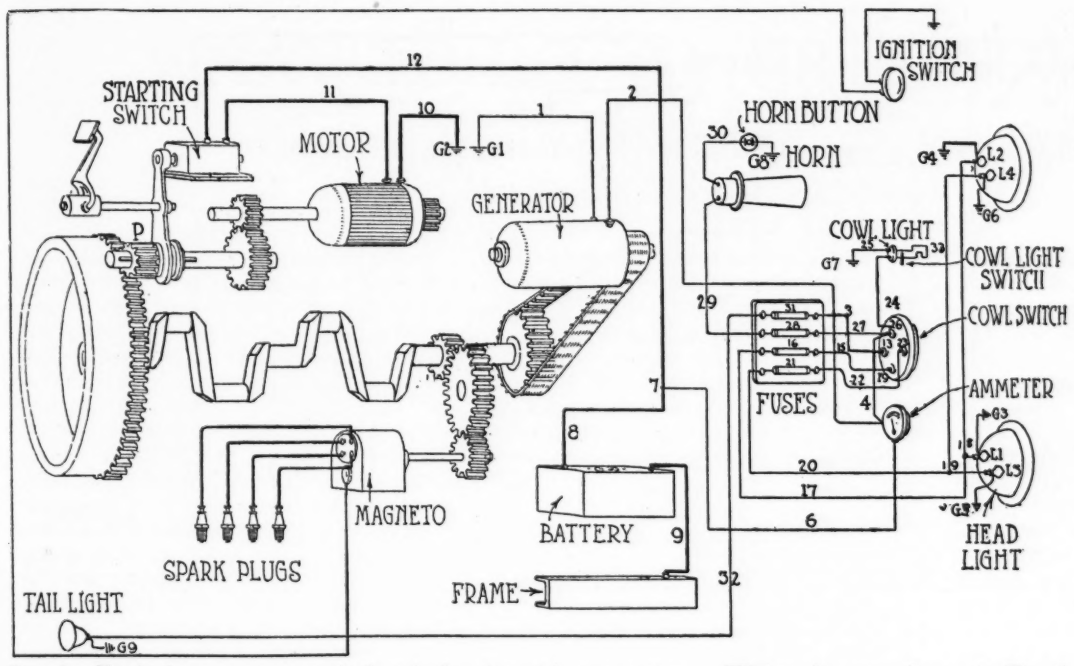


Fig. 1—Typical arrangement of electrical units with connections. Wiring diagram shown in Fig. 3

through wire 8, and none through wire 12, because the starting switch is open.

The ignition in this case is provided by a high-tension magneto driven from the engine shaft by gears. The ignition circuit is not shown in detail but it is controlled by the ignition switch shown in the upper right-hand corner.

The motor circuit may be traced in a similar manner by starting with the ground connection G2. You follow along the wire 10, through the motor along the wire 11 to the starting switch, through the starting switch, when it is closed, along the wire 12 to the junction point 7, along the wire 8, through the battery, along the wire 9 to the frame of the car, which is the same as the ground connection G2, from which you started. The motor switch in this case is operated by pressing on a pedal, which also causes a pinion P on the motor shaft connection to engage with a gear on the flywheel and thus establish a mechanical connection between the motor and the engine shaft. This mechanical connection between the engine and the motor is maintained and the electrical circuit through the motor and battery remains closed as long as the pedal is pressed down.

The electrical circuit for the low candlepower headlights, when they are operating off the storage batteries, may be traced as follows: Starting with the frame of the car or grounded terminal of the battery you pass along wire 9, through the battery and along wire 8 to junction point 7, then along wire 6 through the ammeter along wire 4 to terminal 26 of the cowl switch, then from terminal 14 when the switch is closed, along wire 15 through fuse 16, along wire 17 to the junction point 18, where the circuit divides, part of the current passing through bulb L to ground G3 and part through bulb L2 to ground G4. The ground connections G3 and G4 are the same as the point from which you started. The circuit for the high-candlepower headlight is the same as that for low-candlepower lights up to terminal 26, then with switch thrown to terminal 23 you pass along wire 22, through 21, along wire 20 to junction point 19, where circuit divides, part of current going through bulb L3 to ground G5 and part through L4 to ground G6. It will be observed that this last circuit was traced through the battery in the opposite direction to that of the generator and motor circuits, but the results are just the same except in one case you will follow along the circuit in the direction of the current and in the other case in the opposite direction. In each case you must return to the point from which you started.

The circuit for the cowl light is the same as the headlights up to switch terminal 26, then along wire 24 through the cowl light switch 33 and bulb along wire 25 to the ground connection G7. The circuit for the horn is the same as that for the headlights up to terminal 26 on the cowl switch, then along wire 27 through fuse 28, along wire 29 and through the horn along wire 30 through the horn button when it is closed to the ground connection G8.

The circuit for the taillight may be traced as follows: From the frame of the car along wire 9 through the battery along wire 8 to the junction point 7 along wire 6 through the ammeter along wire 4 to terminal 26 to terminal 13 when switch is closed through wire 3 through the fuse 31 along wire 32 through the taillight and to the ground connection G9.

Assuming the generator is not charging the battery and that all lights are turned on and the horn button is closed, determine the current in the different wires. Wires 9, 8 and 6 will be carrying the total current supplied by the battery.

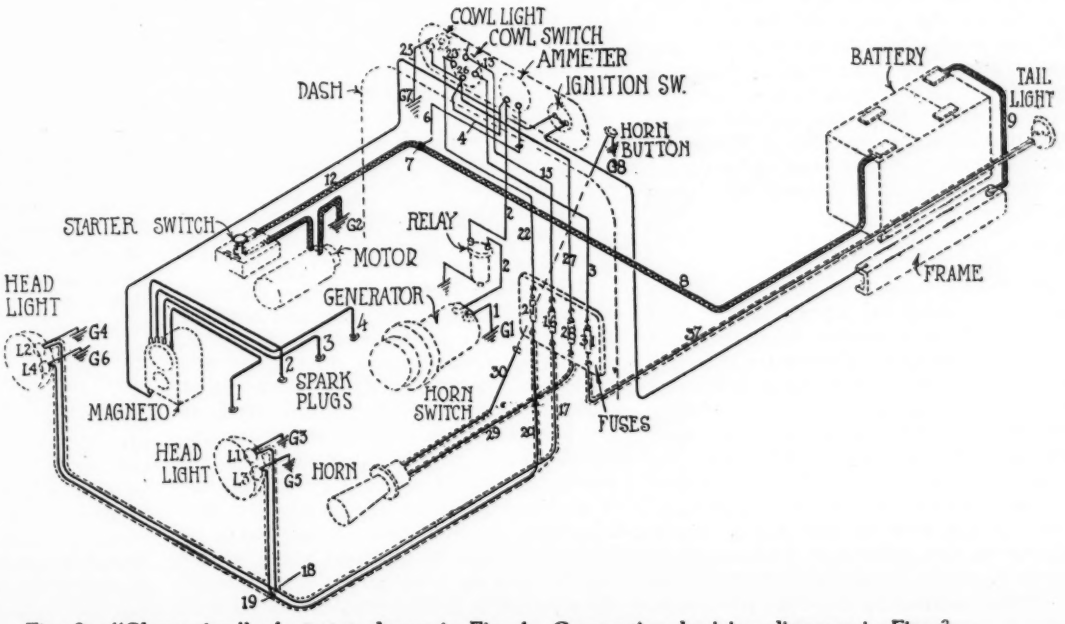


Fig. 2—"Ghost view" of system shown in Fig. 1. Conventional wiring diagram in Fig. 3.

The current in wire 12 will be zero, since the motor switch is open, so that the current through the ammeter is that taken by the large and small headlights, horn, taillight and cowl light. Wires 4, 3 and 32 carry the current for the taillight. Wire 4 carries the current taken by the horn, headlight, taillight and cowl light. Wires 27, 29 and 30 carry the current taken by the horn. Wires 15 and 17 carry the current taken by the low-candlepower headlights. Wires 20 and 22 carry the current taken by the high-candlepower headlights. If the motor switch is closed, the current in wires 8 and 9 will be equal to the current supplied by the battery, and wires 10, 11 and 12 will carry the motor current.

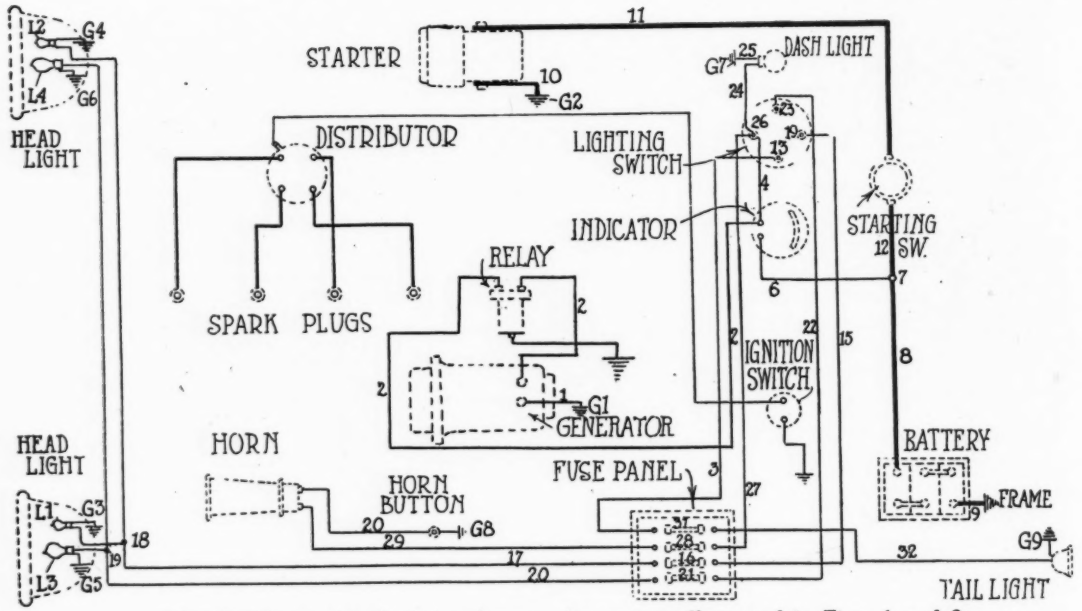


Fig. 3—Conventional wiring diagram for system illustrated in Figs. 1 and 2.

Assuming the motor circuit open and all the other circuits closed and the generator delivering current, if the current delivered by the generator is just equal to the current taken by the horn, taillight and headlights, there will be no current in the ammeter. If the current delivered by the generator exceeds in value the current taken by the horn, tail, cowl and headlights, the current in the ammeter will be toward junction point 7, and the ammeter will show charge. Should the value of the generator current exceed that of the combined currents taken by the horn, taillight, cowl light and headlights, a charging current will be sent along wires 6, 8 and 9. When all the lamps and horn are disconnected, all current supplied by the generator passes through the battery. If the terminal voltage of the generator is lower than the terminal voltage of the battery, then the battery will supply current to all the lamps and horn and in addition send a current through the generator, unless the connection between the generator and battery is broken by some form of cut-out, and the generator will tend to operate as a motor. When the battery is supplying current through the lights or horn the ammeter will show discharge.

Electrical Circuit a Circle

The reader must bear in mind always that every electrical circuit is just like a circle. It has neither beginning nor end. It is absolutely imperative that you be able to trace the various electrical circuits on the motor car to clearly understand their operation and know how to test and locate readily the various causes of trouble which are likely to arise. Always bear in mind that electricity is not used up and just as much returns to the generator or battery as leaves it. It is the energy, or ability to do work, possessed by the electricity when it leaves the generator or battery when the battery is discharging which is used in each of the electrical circuits.

The primary purpose of every wiring diagram of a starting, lighting or ignition system is to show the proper electrical connections between the various devices which go to make up the complete systems. These wiring diagrams are often quite a puzzle to the inexperienced man, and also to the man who has not taken time to give these the necessary consideration in connection with the installation, maintenance or repair of the different systems which he has worked upon.

One of the chief reasons why a wiring diagram is of no real assistance to the majority of men working on the electrical equipment of motor cars is due to their lack of a clear conception of the proper operation of the various electrical circuits which go to make up the complete systems. Another, and almost equally important reason, is the lack of sufficient imagination to follow along the various electrical circuits just as though the wires and different devices were suspended in space and absolutely independent of all other parts of the car. The relations of the component parts of a starting, lighting and ignition system were shown in Fig. 1. The various electrical circuits were traced in detail for practically all conditions of operation of the different combinations.

The actual locations of the different parts of a starting, lighting and ignition system similar to the one shown in Fig. 1 as they would appear on the car are shown in Fig. 2, which might be called a ghost view of the electrical equipment and circuits. The various electrical circuits traced in Fig. 1 easily may be traced in Fig. 2 by using exactly the same description as the same lettering has been used in both cases. Such a diagram should be of great value to the repair man in tracing the actual electrical circuits on the car, as he, by reference to this kind of a diagram, easily can identify each individual conductor, the circuit to which it belongs and the current it is supposed to carry under normal conditions.

A type of wiring diagram usually supplied by the manufacturers of starting, lighting and ignition equipment is shown in Fig. 3. This is a diagram of the same system shown in Figs. 1 and 2, and the same lettering has been used in designating the different parts, wires and connections as was used in Figs. 1 and 2. It thus is seen that the wiring diagram itself merely gives the different electrical connections without reference to the relative location of the different parts and devices forming the various electrical circuits.

Analysis of Trouble

The various kinds of individual troubles which may occur on any particular system are so numerous that it would be impossible to expect the reader to wade through a detailed description of each and every one. A description of the more important ones and those that are most likely to occur will be given, and with these as a basis the reader may go on and study the more uncommon cases and perhaps more complicated cases.

You must have in mind that there are three things associated with every electrical circuit, namely, the resistance of the circuit which opposes the free movement of the electricity around the circuit, the electrical pressure, or electricity moving force which causes the electricity to move through the circuit, and the electric current which is a measure of the rate at which the electricity is moving just as the current in a river is a measure of the rate at which the water is moving down the river. The rate at which the electricity, or current, moves in amperes is equal to the effective electrical pressure in volts acting in the circuit divided by the resistance of the circuit in ohms. Thus if a lamp circuit has a resistance of 2 ohms and the

(Continued on page 90)

WHAT TO DO TO TIRES IN WINTER

Essential to Vulcanize Bad Spots—Car's Weight Should Not Be On Tires When Stored

A GREAT trouble in winter driving is water working its way into neglected cuts in the tread of a tire, rotting the fabric and eventually causing a blowout. This means that the tires should be gone over at this season of the year, and all large cuts vulcanized and the smaller holes filled with tire putty. Tire repair work is one of the specialized forms of service; that is, in a good many instances it is not a part of the motor car dealer's establishment. Especially is this true in the larger cities, but we also find the same thing holding true in many small towns. Still there are thousands of dealers who have a tire repair department and winter affords a good chance to do a lot of work.

Chance for Service Car

No car owner likes to repair a tire out on the road in cold weather, and by maintaining a good service car equipped with spare tires, tubes, etc., which the dealer can shoot out to a stranded customer, he will be building up a reputation for good service, especially if this fact is advertised. As a suggestion, the dealer might invite owners to drive into the service station and have tires inspected, giving a cost estimate on repairing and putting them in shape for winter use. This should include checking up on the spare, because this is one of the most neglected parts of a car, especially in winter. By all means sell the car owner a cover for the spare. What applies to the other tires in the way of repairing cuts applies equally well to the spare. Also, see that the spare does not rub on the carrier parts, which means that the supporting straps should be tight enough to prevent any looseness. A spare tire often wears as much on the back end of a car as on a wheel.

Watch Inflation Pressure

It is just as necessary to watch the inflation pressure of tires in winter as in summer, and the only way it can be ascertained accurately is with a gauge. Never guess at the pressure in a tire. You cannot tell a difference of 20 or 30 lbs. by kicking or looking at the tire. Under inflation is the chief offender. Tires that are not pumped up sufficiently will suffer greatly in winter, because rough ruts and particles of ice will pound holes into the casings. The least that can be done is to see that the tires are pumped up to the maker's specifications. On this page is a table showing the inflation pressure for different sizes of tires.

On cars that are left with the dealer to store and whose owners wish to take them out occasionally in winter, certain things regarding the tires must be done. It is always well to look over such cars and see that none of the tires is flat, as a flat tire in cold weather will suffer damage if the weight of the car is on it for any length of time. Also make sure that the tires are not resting upon any tool or other object, which amounts to the same thing as giving the tire a severe blow against the curb. The fabric is stretched considerably, and eventually will weaken the tire. All oil, etc., should be wiped off the floor where cars are stored. Of course, if the cars are to be in for any length of time, it is best to make some wood horses to put under the axles and thus take the weight off the tires.

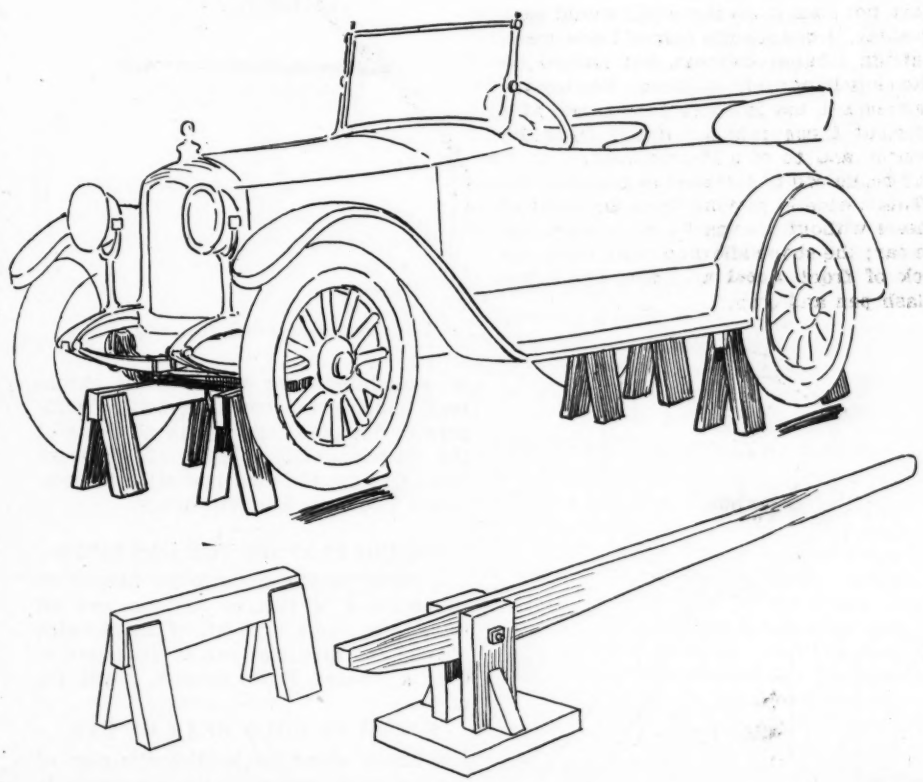
INFLATION PRESSURE	DIAMETER OF TIRE SECTION				
	3"	3½"	4"	4½"	5"
30	250				
35	290	360			
40	335	410	500		
45	375	460	560	675	
50	415	515	625	750	875
55	460	565	690	825	960
60	500	615	750	900	1050
65		670	815	975	1135

Tire inflation chart for various sized tires

Never allow mud or other foreign matter to remain on tires that are on cars in storage. They should be washed with soap and water. Another point to watch in winter is putting graphite on the threads of the rim bolts. Unless this is done the nuts will get stuck and removal will be a difficult matter. The packing nut on the tire valve should be screwed down tight to prevent water getting into the tube. This is important because cars are often left at the curb in water half way up to the hubs.

Use Tire Chains

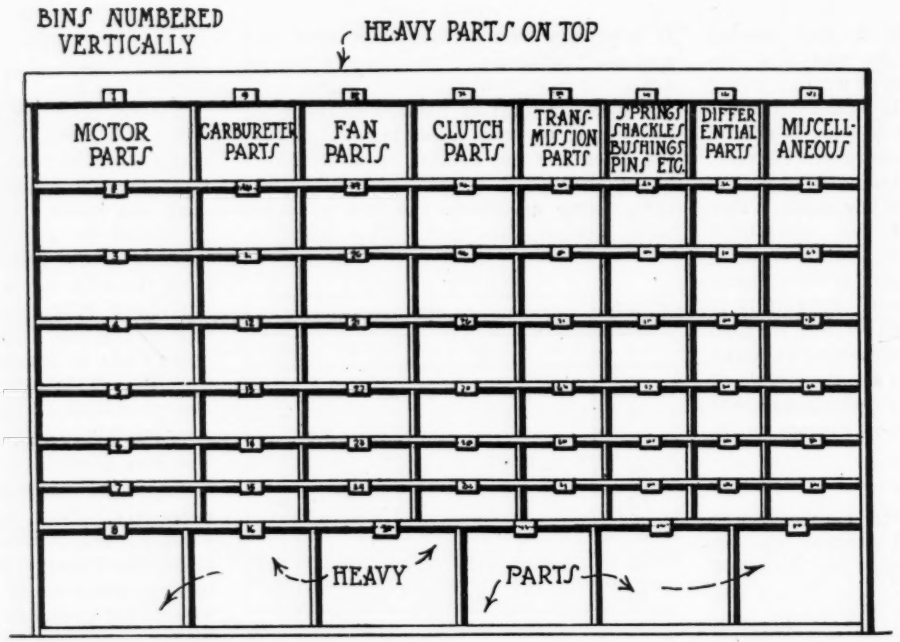
Slippery roads makes anti-skid devices necessary. They should be used only when needed, however. Some mechanics make the mistake of applying them too tightly, presumably to eliminate noise. The added pressure of the tire and flattening out at the point of contact on the road causes the chains to play havoc with the tires. Cross chains eventually become worn and must be replaced. If this is not done cutting of the casing will result.



Tire life is increased by putting the car on horses as shown above. Below is a quick acting jack easy to make

Time Savers In The Shop

Various Suggestions That Speed Up Service and Make For Repair Efficiency

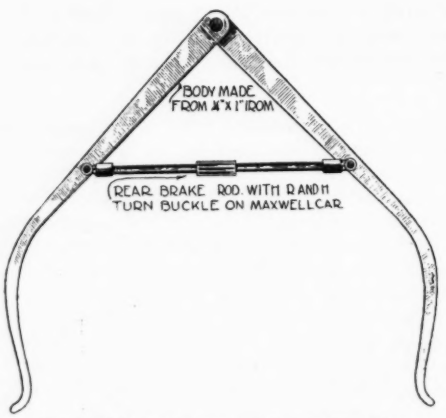


Systematic arrangement of parts in stock room bin

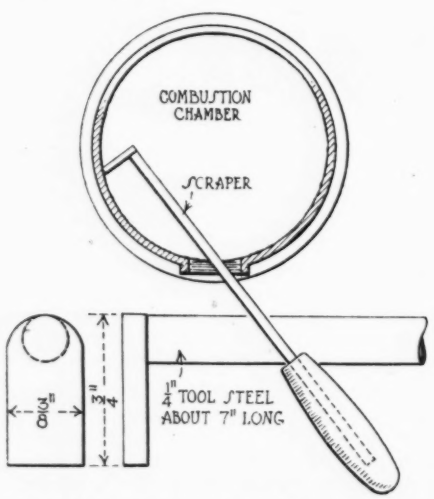
HOME-MADE WHEEL ALIGNER

I have seen all kinds of devices for aligning front wheels, and watched for the type I have been using, but so far have not seen it, so thought I would pass it along. I use a large pair of home-made outside (shape) calipers, but shaped on the ends like inside calipers. For my adjustment I use a short brake rod with clevises and turnbuckle taken from the rear brake rod of a Maxwell car.

This device is designed to trammel the wheels without moving from the front of the car; the shape allows me to reach the back of front wheel and still miss the splash pan and frame. I also find it fine in examining rear wheels; cam checks rear housing for trueness, setting calipers in one place and trying all parts of the wheels; also able to check front wheels to get the dish just alike in both. —Bob Paquette, Paquette place.



Gage for measuring tire alignment



Method of removing carbon in cylinders wide side spark plug

MAKING FLANGES FOR GAS LINES

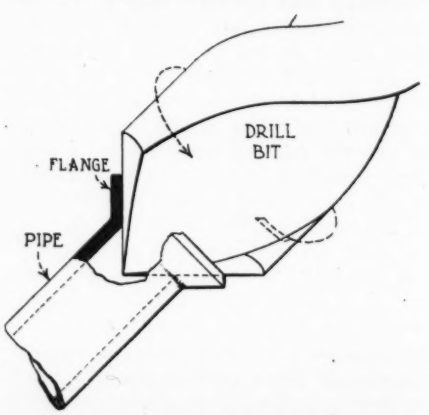
A short cut we have found helpful in the making of flanges for gas and oil lines is to use a drill bit of about twice the size of pipe and run it backward.—Geo. A. Phares, Royal Garage, Royal, Ill.

STAND TO HOLD REAR OF CAR

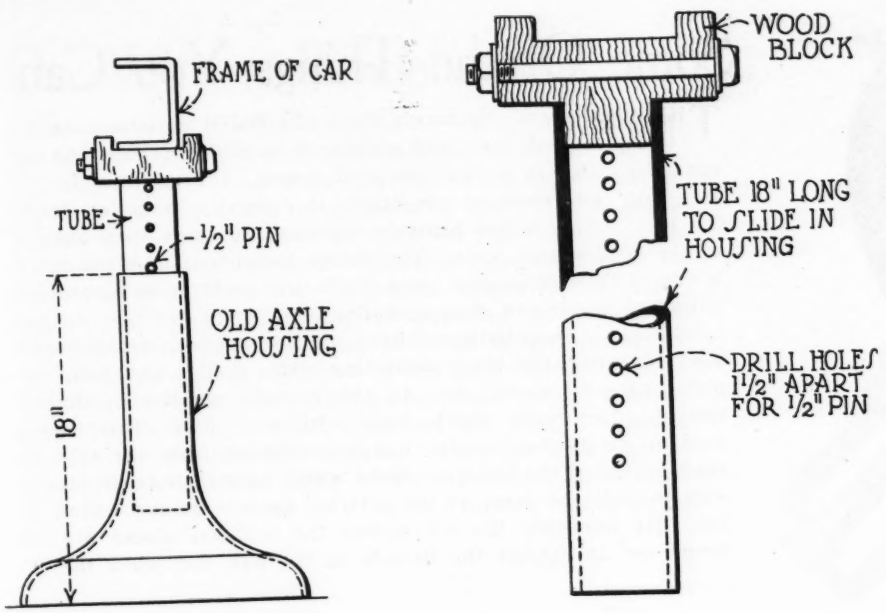
A handy stand for holding the rear of car up when removing the rear axle is made by taking a pair of old axle housings and cutting them 18 in. high. Then get two tubes which slide inside of the housing, cut them 18 in. long, drill holes 1½ in. apart in this tube to take a ½-in. pin. Then put a wood block on one end and cut away on top to go on frame and not slip. Put a bolt through this so it will not split.—Edward H. Zwiebel, Lake Geneva, Wis.

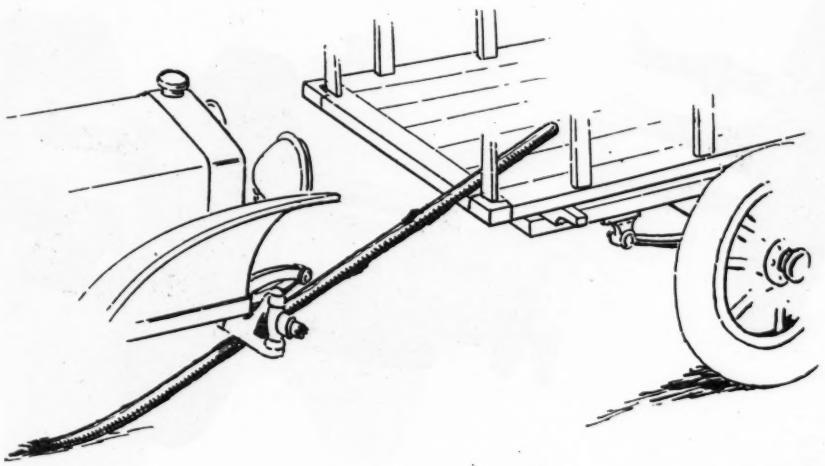
HAULING IN DAMAGED CAR

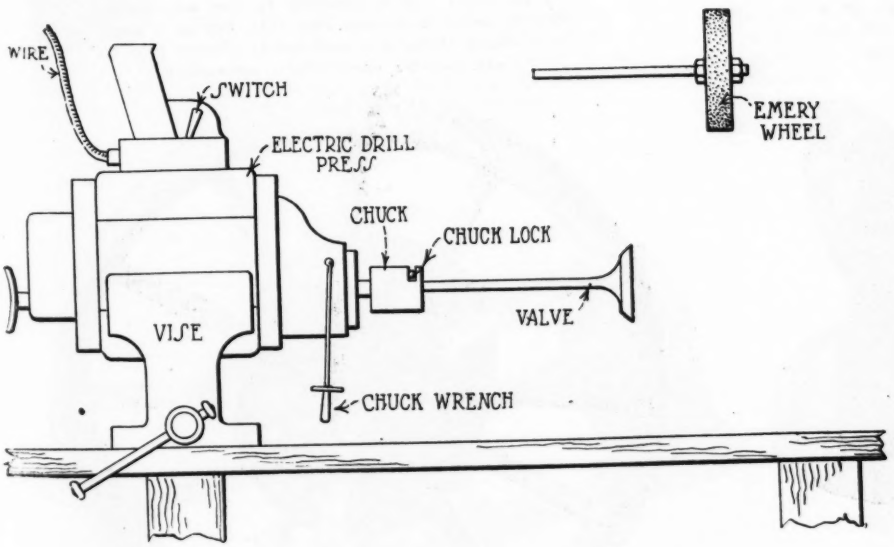
We were called on to move a 7-passenger Studebaker two miles which had the right front wheel off and the spindle broken. We had no truck or service car to put under the machine and take the place of a wheel, so we used a green pine sapling about 3 in. in diameter, with the lower end smoothed as a shoe or skid. We then jacked the car up and slipped the skid under the axle, leaving the spindle free so the left wheel could steer. Then the top of the skid was rested on



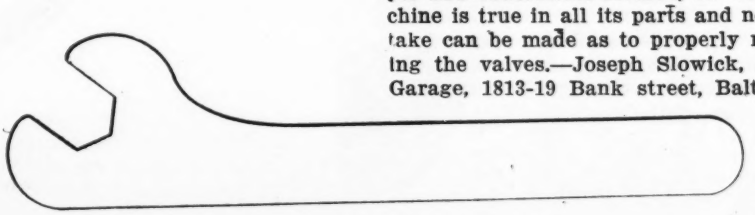
Flanging the end of a gas tube







Top, stand to hold rear end of car. Center, how to bring home a disabled car. Below, jig for grinding valves. Right, wrench made from old Ford axle



the rear of a truck and both cars were started. It was driven two miles under its own power, the truck not pulling, but merely taking the place of the

REMOVING CARBON FROM CYLINDERS

In an engine having spark plugs on the side the carbon can be easily removed in the following way: Put cylinder No. 1 up to top and scrape out carbon with a scraper as shown. Have the blacksmith take a piece of ¼-in. tool steel about 7 in. long.—Geo. R. Foister, 6604 Fir avenue, Cleveland, Ohio.

BINS TO SPEED UP SERVICE

We have a remedy for unnecessary footwork around the stockroom parts bins. The bins which we use most are placed in the center of the stockroom—two sections placed back to back, forming eight double rows. We had been filing the various parts for trucks and automobiles in the bins on the horizontal plan, the numbers running across the rows and without any particular grouping, except for convenience in the size of the receptacles for the parts deposited therein. We have evolved a method whereby time and energy are saved, and the service manager can get results on the dot. The plan is to group parts and number the bins vertically, segregating the units in the most logical manner. The very heaviest parts are placed on top of the bin section, as though on a shelf, and in the bottom row are placed rather heavy mechanisms.

Our scheme includes filing parts about as follows: Beginning at the left, first vertical row engine parts; second, carbureter parts; third, fan parts; fourth, clutch parts; fifth, transmission parts; sixth, springs, shackles, bushings, pins and various other small pieces; seventh, differential parts, eighth, miscellaneous but frequently used parts. One bin section is for trucks and the one backed against it is for automobiles.—B. L. P. Motor Co., Philadelphia.

MADE FROM AN OLD FORD AXLE

Open-end wrench for general purposes. The completed wrench is 8 in. long and the opening in the head is shaped from a ½ in. nut.

FOR REGRINDING VALVE SEATS

A scheme we have employed for the regrinding of valve seats, using an electric drill, is suggested here. The machine is put into a vise as indicated and the valve is placed in the chuck. After the valve is made tight in the chuck of the electric drill, a lathe file is used and thereby properly reseated. This is a simple and economical method, for the machine is true in all its parts and no mistake can be made as to properly reseating the valves.—Joseph Slowick, Arrow Garage, 1813-19 Bank street, Baltimore.

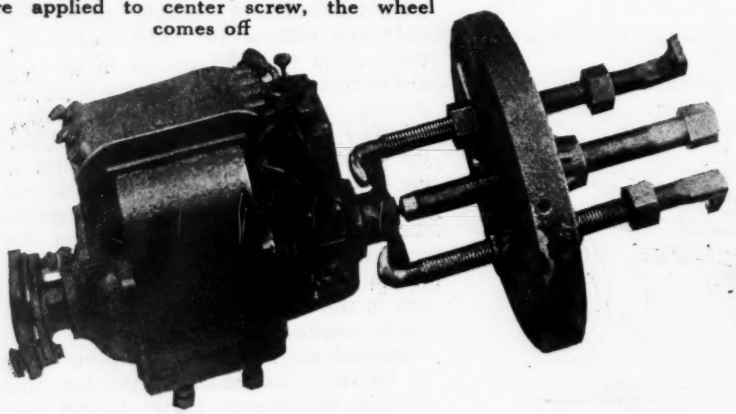
Some Of the Things You Can

THE small service or repair shop will find it an advantage to lay in such tools and machinery as will do more than one operation. In a large shop, of course, while such a device also will show to advantage, it generally is better in the long run to install separate machines, or more than one of the combination tools. The device shown on these pages is one of the combination tools which will perform an almost unlimited number of shop operations.

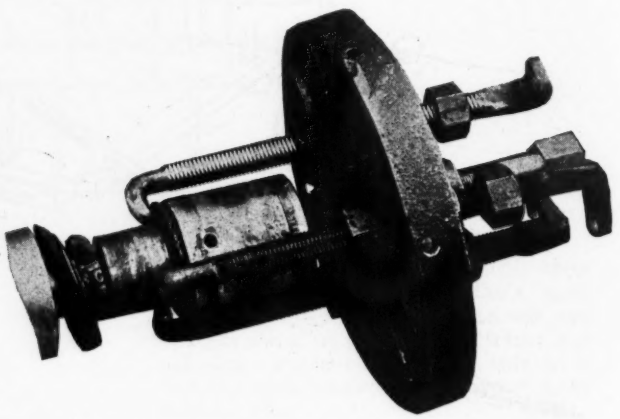
While it is essentially a wheel and gear puller, it can be used to straighten bent connecting rods, shafts, and force piston pins in or out, etc. All this is made possible by the special attachments which come with the outfit. Thus, a wire or wood wheel readily can be pulled off from the axle shaft by use of the hexagon blocks which have their faces cut with threads the same as the external threads on the wheel hub. By adjusting the set screws the hexagon blocks are firmly set up against the threads in the hub and when the



Pulling a steering wheel. In this operation the hook ends are placed under the spider arms, the hooks pointing in opposite directions. When the locknuts are set and pressure applied to center screw, the wheel comes off



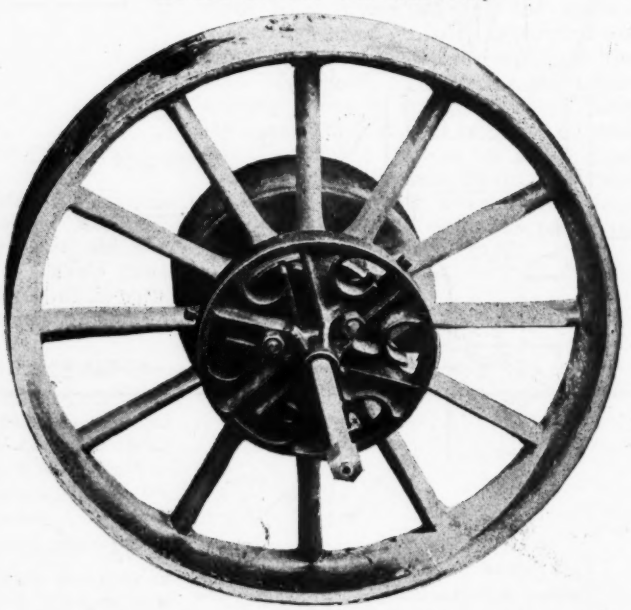
Removing a generator coupling. This is a simple operation and removes the coupling without damage to any of the parts. The center screw has a tool steel cap which prevents spreading of the center. This is a typical case where it is hard to get off the coupling by prying or hammering



Here the puller is shown forcing off a universal joint. It is possible to use any number of arms in a case like this, but as a general thing three are sufficient. From two to six can be used when necessary



Portable press attachment, by which a piston pin is being forced out. Two puller arms are used with the press plate. This attachment will take any work up to 8 in. diameter. It can be held in a vise or bolted to the bench



Pulling a wheel by use of hexagon blocks, which fit the hub threads. Hubs from 2 to 7 in. diameter can be handled

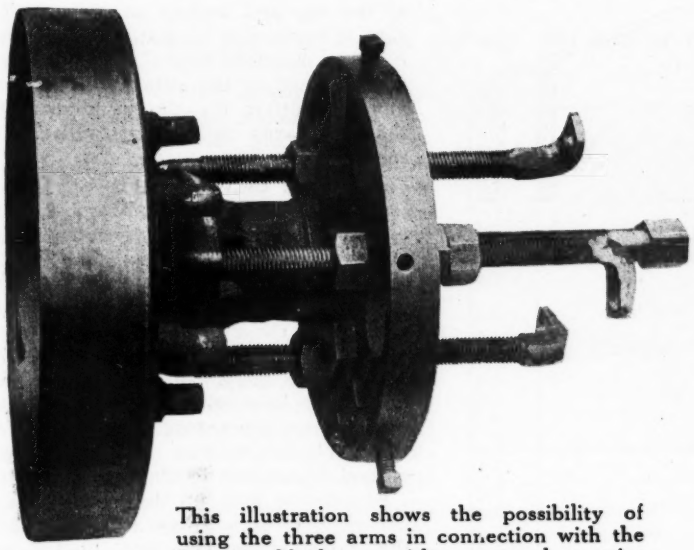
Do With a Wheel Puller

center screw is turned to the right the wheel slips off. For left hand threads it is only necessary to reverse the blocks.

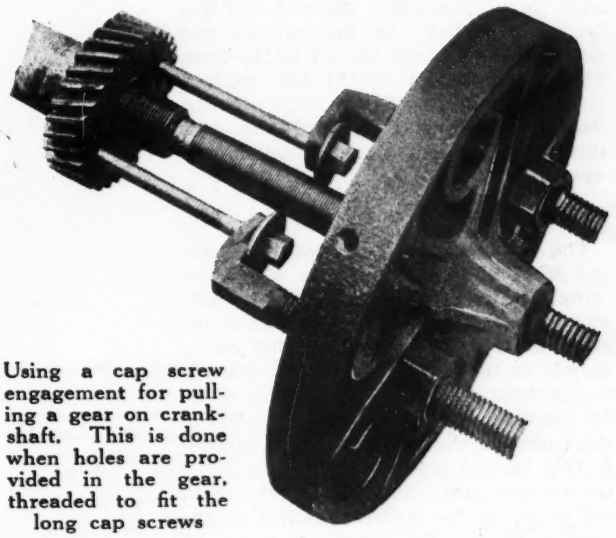
A puller of this kind is far superior to the old method of trying to hammer a gear or pulley off a shaft and the same applies to forcing the steering wheel off the steering shaft. Very often it is possible to supplement the assortment of hooks and other parts with shop-made devices so the puller can be used for any particular job otherwise hard to get at. The time spent in making such additions is not wasted, as the next time such a job comes in the tools will be there to speed up the work. To get off a crankshaft gear it is often necessary to take the whole shaft out and place it under a press, while with a puller suitably set up the work can be done with the shaft in place. The puller shown here is the F. & W. Universal, made by Frisz & Wiltshire, Indianapolis, Ind.



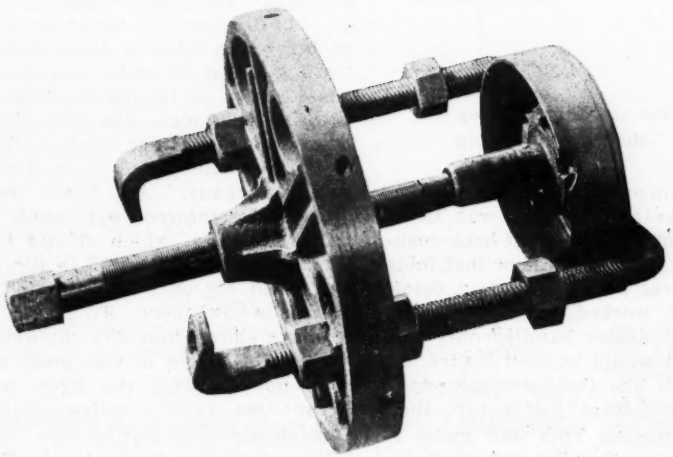
Straightening a connecting rod by using two large arms, turned right and left, pressure being applied to rod by turning center screw. The puller will straighten any shaft up to 3-4 in.



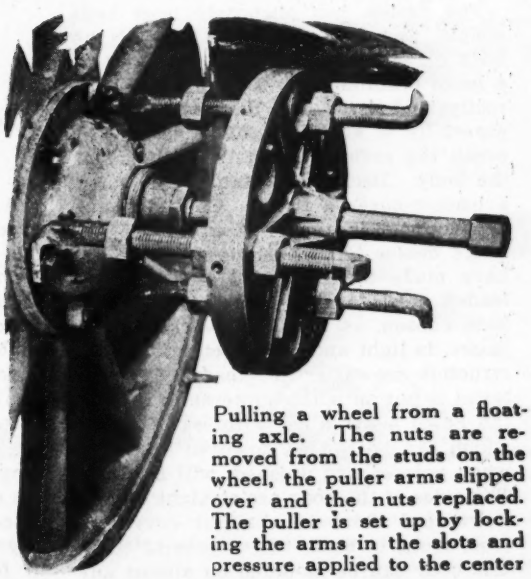
This illustration shows the possibility of using the three arms in connection with the hexagon blocks on either a wood or wire wheel hub, the arms gripping the flange and the blocks the threads



Using a cap screw engagement for pulling a gear on crankshaft. This is done when holes are provided in the gear, threaded to fit the long cap screws



Pulling a fan fulley with two arms. Even if the pulley is within 1-4 in. of the crankcase the small arms will go behind it. On an easy job like this the center screw can be turned by hand



Pulling a wheel from a floating axle. The nuts are removed from the studs on the wheel, the puller arms slipped over and the nuts replaced. The puller is set up by locking the arms in the slots and pressure applied to the center screw

Building Bodies for Used Cars

Suggested Design and Method of Constructing Simple Body to Meet Average Demand

IN modernizing old models of cars one of the chief difficulties is to get a good looking body and at the same time one which can be built by men in the average service station or repair shop. Used cars are easy to sell if equipped with new bodies, although at present dealers are having little difficulty in disposing of their line of used cars. However, good, serviceable cars like the high-priced models of several years ago would bring a bigger price very often if dressed up in a different way, for generally it is only the body that is obsolete.

On the opposite page is shown a suggested design for a body which not only looks well but is easy to build and comfortable to ride in. One of the big mistakes rebuilders often make is getting the seats too low. On this car the seat cushion is 10 in. from the top of the floor, which is sufficient height for comfort. Also, on this particular car the steering gear has not been lowered; this is often quite a job and runs into many unforeseen difficulties.

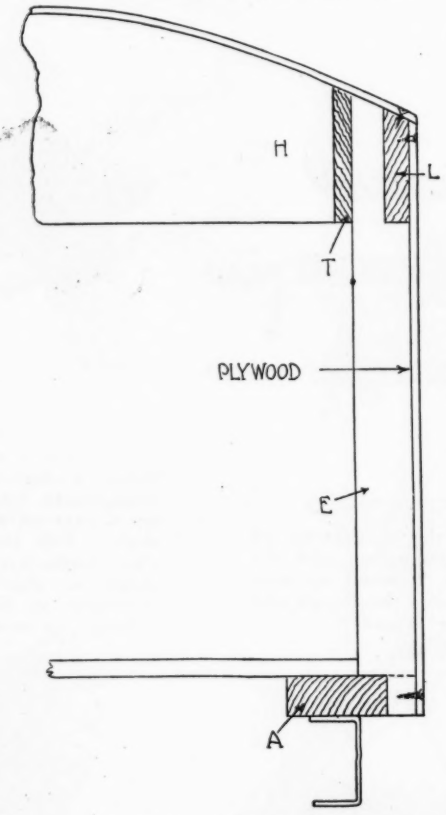
Fitted to Many Chasses

The design shown is applicable to most any kind of chassis and as a general thing it is well to leave the original radiator and hood intact, which means the curve on top of the dash, or what corresponds to the rear end of the hood will be the determining factor as to the curve for the cowl. For instance, the radius of the curve on the dash of the car shown is 28½ in. and using the same center on the vertical center line, we find the highest point, or the greatest radius of the cowl is 30 in. The drawings shown on these pages are drawn to scale, so that any dimensions can be taken from them.

The design has purposely been kept simple, and by cutting the end of the body off square, as shown, it allows of a large gasoline tank to be mounted directly behind it. The lines of the tank, especially if an oval tank is used, will break the severity of the abrupt end of the body. Back of the tank is mounted a leather-covered trunk. This makes a neat-looking job and one which the average dealer is in position to make, or have made for him. Instead of using leaded steel for the body, plywood has been chosen, as it can be worked much easier, is light and imperfections in construction are easier to remedy. The material is put on with countersunk screws, the holes being filled with water putty, which can be sanded down so the body, when painted and finished, will be flush. The sides of the body are straight up and down, but there is a slight curvature from front to back. As a general thing this body can be mounted on almost any frame, because if changes are necessary they are generally confined only to varying the width at the dash and, possibly, the curvature of the cowl. The angle of the steering column is what you will find in the average car. Of course, where a racing type job is wanted, the steering gear had better be lowered and bucket seats placed directly on the floor.

One Door Simplifies Work

To simplify the job, only one door is fitted on the right side. Back of the seat is a carrying compartment, access being had by two hinged covers fitted with a lock at the center. Another way to do this would be to make the seat back cushion removable, and have a door that folds down in the seat back. This is a detail which can be worked out to suit the dealer. If the dealer handles only one make of car it would be well before assembling a job like this to make paper patterns of all pieces just before they are put into place. This will make it easy to lay out another job and you have the advantage of having a record of each piece. Or, a planing mill can cut out any number of pieces from the patterns, or for that matter, make up the bodies in the rough, leaving the finishing and painting to the dealer's paint department.



Sectional view of body, showing the general scheme of building

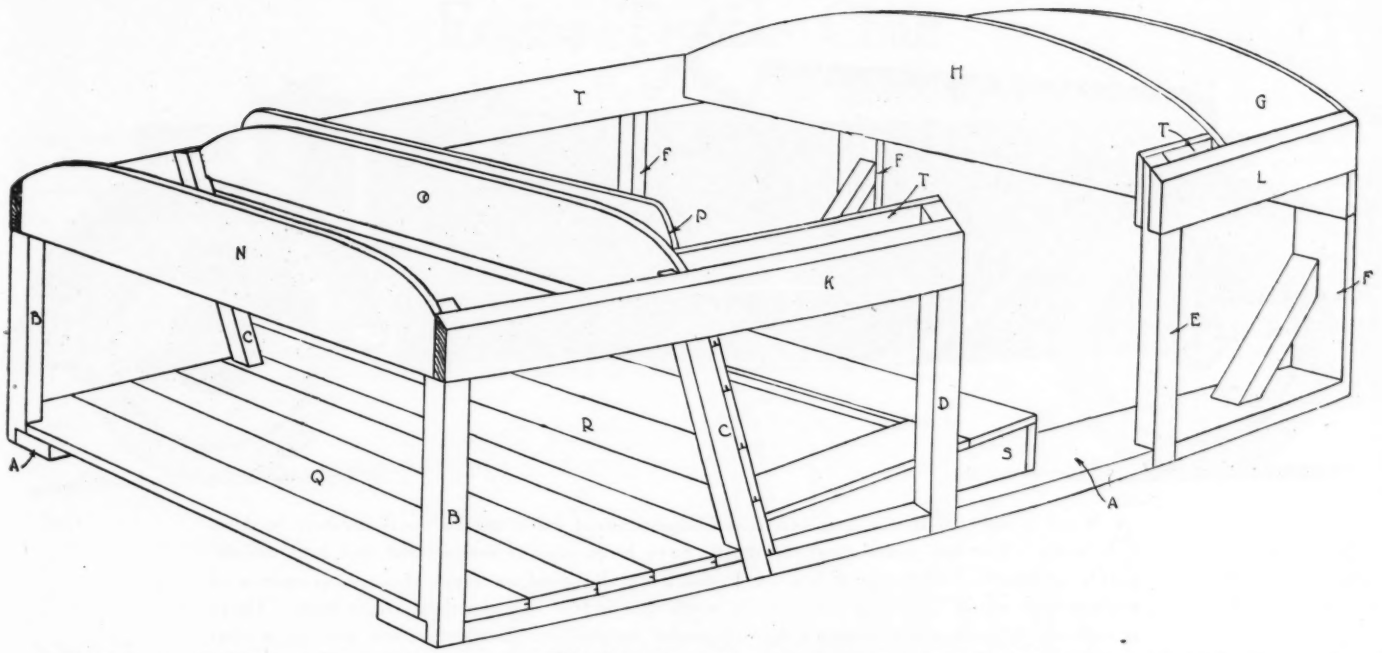
The first pieces to get out are the sills, marked *A* in the illustration of the framework. The curvature of the sills can be taken from the plan drawing by spacing off the width from the inner straight line of the sills at about every 4 in. You then will have a series of dots through which a line may be drawn representing the outside curved line. Only one need be layed out, as it can be reversed on the other sill and a line simply drawn around it. The posts, or upright pieces *B*, *C*, *D* and *E* all are 2 by 2 in. notched at the top and bottom as shown. The dash is made of ¾ in. material, the pieces *F* being mortised into *G*. The pieces *F* are fastened to the sills by angle irons and in addition the sloping timbers for the footboards to rest on will act as supports.

Care Should Be Used in Fitting

Place a square against *F* and the sills to get them at right angles. The angle of the seat back *R* can be taken from the side elevation and the pieces *C* placed accordingly. In assembling the framework place the sills directly on the frame of the car and bolt them down with a few bolts, using the holes that held the old body. By assembling the body in this manner you are assured it will fit when the whole job is done, besides it makes a good foundation to work on.

Be sure to shim up the sills if this is necessary in order to get both of them in the same plane. A straightedge and level will tell you when they are placed correctly. After the timbering is done the body can be removed and the plywood put on. Before doing this it is a good plan to find out where your instruments are going on the instrument board *H*. For instance, it might be necessary to bring the latter a little further forward in order to make the speedometer shaft reach, or to accommodate the oil pressure gage pipes, etc. The instrument board might well be made of birch, as it can be stained and finished to represent mahogany. All joints should be glued and reinforced with angle irons.

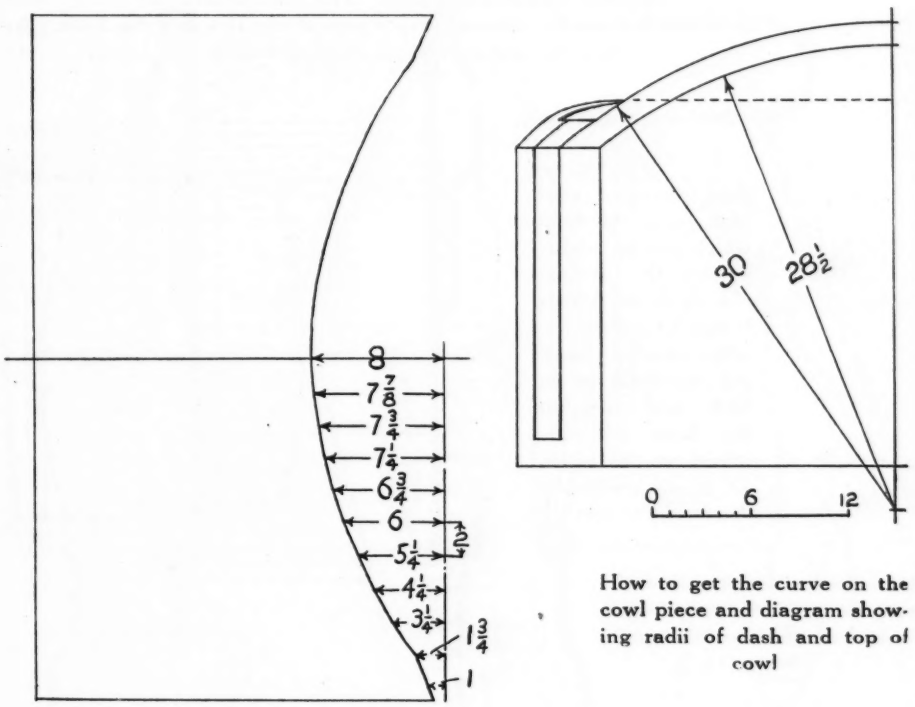
The plywood, which should be about 3-16 in. thick can be had in large pieces and about the only difficult piece to get out is the cowl piece. To aid the builder, we have shown herewith the method for getting the curve in this piece so when it is put in place the piece will look as in the wash drawing of the car. Enough stock is left at the front and sides, which can be trimmed off with a plane and sandpaper when the piece is fastened to the framework. If the curve is severe, it may be necessary to wet the surface of the plywood with hot water.



Body framework before plywood is put on. The door is made of the same material, hinges being applied to post E

A pair of long steel carpenter's clamps come in handy when attaching the plywood. The two side pieces should be put on first and the top edge beveled the same as the pieces *K* and *L*. On the left side the piece *K* runs continuously from *F* to *B*, as there is no door on this side. The next piece to put on is the rear end piece and rear deck cover, then the narrow strips running from it to the cowl piece, the last one to go on. The screws used for fastening should be placed about every 3 in. apart, using ⅝ in. screws. Before sealing up the framework put in the floor *Q*. The front floor boards rest on the sills and should be cut out for the levers and pedals. The seat support is simple framing, the construction being shown in the framework drawing. The back seat cushion, as well as the lower cushion should be made separate, the former being laced to the piece *P* and the latter resting on the framework intended for it. Another way would be to mount bucket seats on the framework.

The gasoline tank and trunk are mounted on runners, 2 in. thick, cut out to fit the kickup in the frame. They are bolted direct to the frame and a 1 in. board placed across the rear for the trunk. The tank straps can be fastened to the runners.

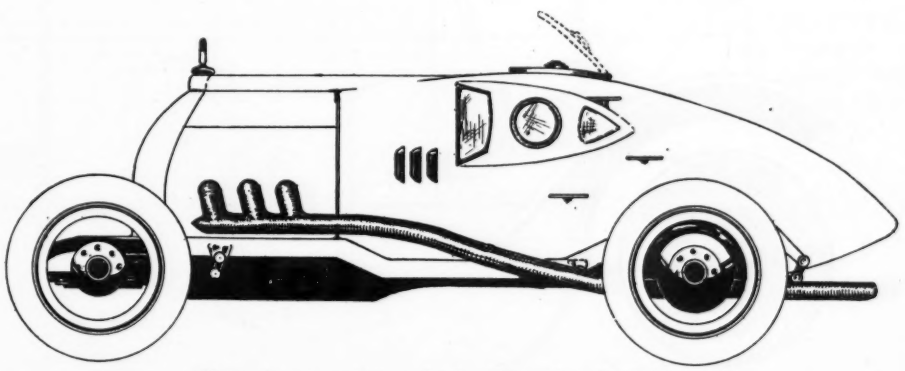


How to get the curve on the cowl piece and diagram showing radii of dash and top of cowl

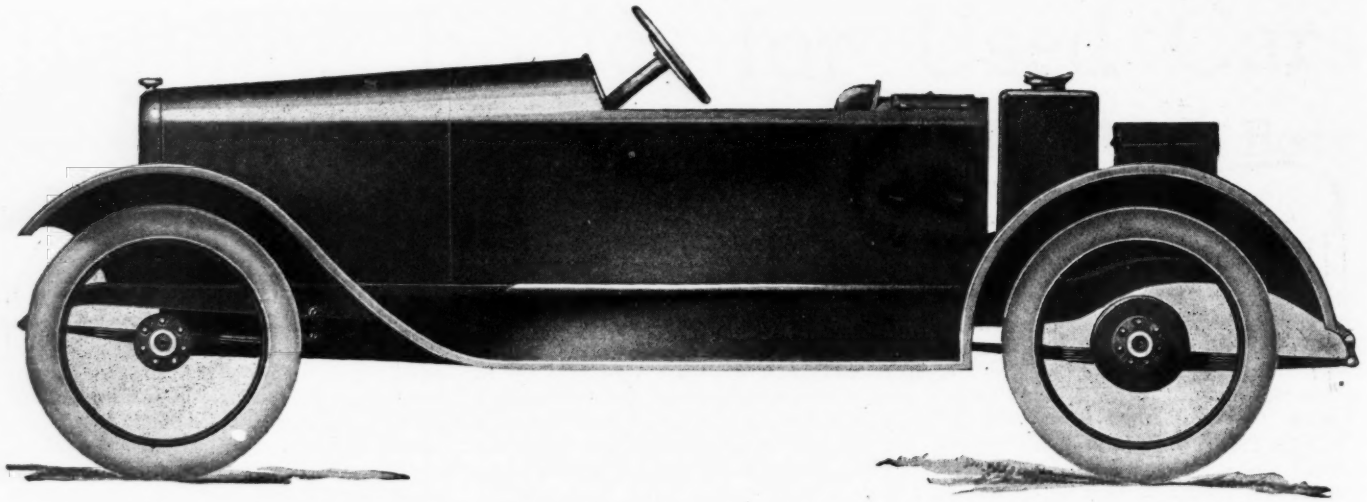
SUBMARINE ON WHEELS

Illustrated on this page is the absolute extreme in body design. This was fitted to a used car on order from a sporting buyer with aquatic proclivities. It is not suggested for general adoption, however.

Satisfied Owners Sell Service

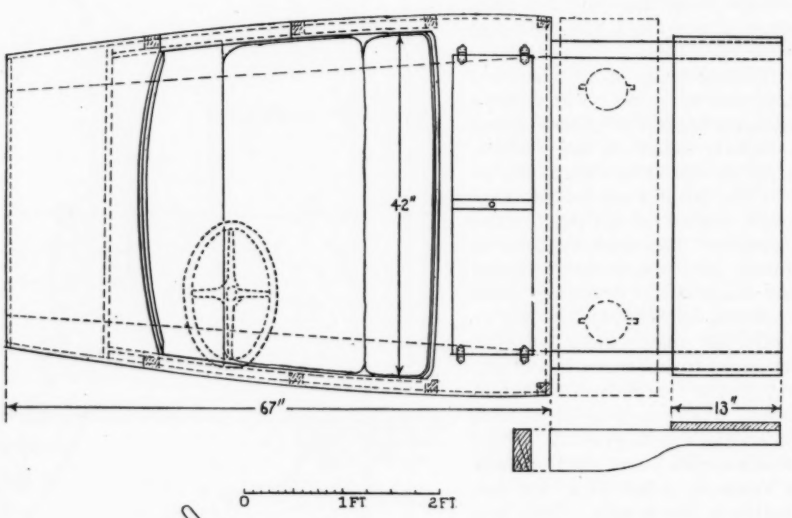


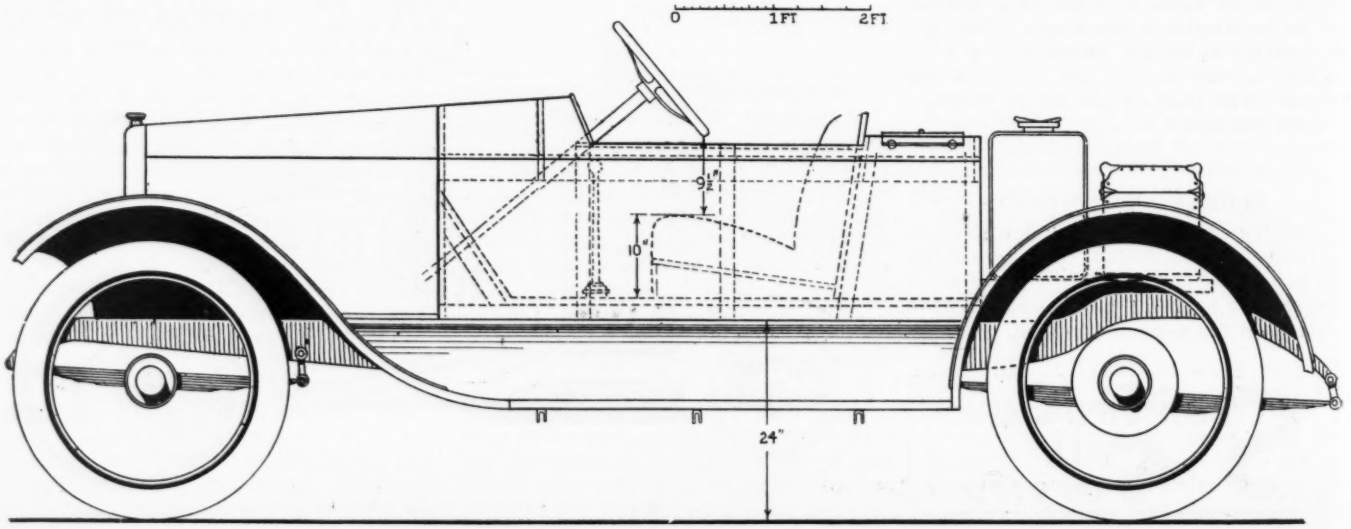
Here is an extreme body idea of submarine style



AN old model car is much easier to sell sometimes if fitted with a more modern looking body. Yet few dealers can afford to have built special bodies that run into considerable money. The body shown here has been designed to meet the requirements of dealers who would like to do some body work this winter to keep their shops busy. There is nothing difficult about making it, and when painted and finished it will put up a neat appearance. Plywood, a wood preparation coming in large sheets, has been chosen for building this job, as the average shop will be able to handle it better than metal, which calls for special equipment. The illustrations below are drawn to scale and all dimensions can be obtained with a pair of dividers and the scale. As a general thing it is best to retain the radiator, hood, running boards and fenders of the old car, unless damaged

Side elevation and plan view of body which can be mounted on the average chassis of old models. It can be adapted to other cars by changing the width of the dash and blending the lines into the others, as the width, 42 in., is plenty for the inside of seat.

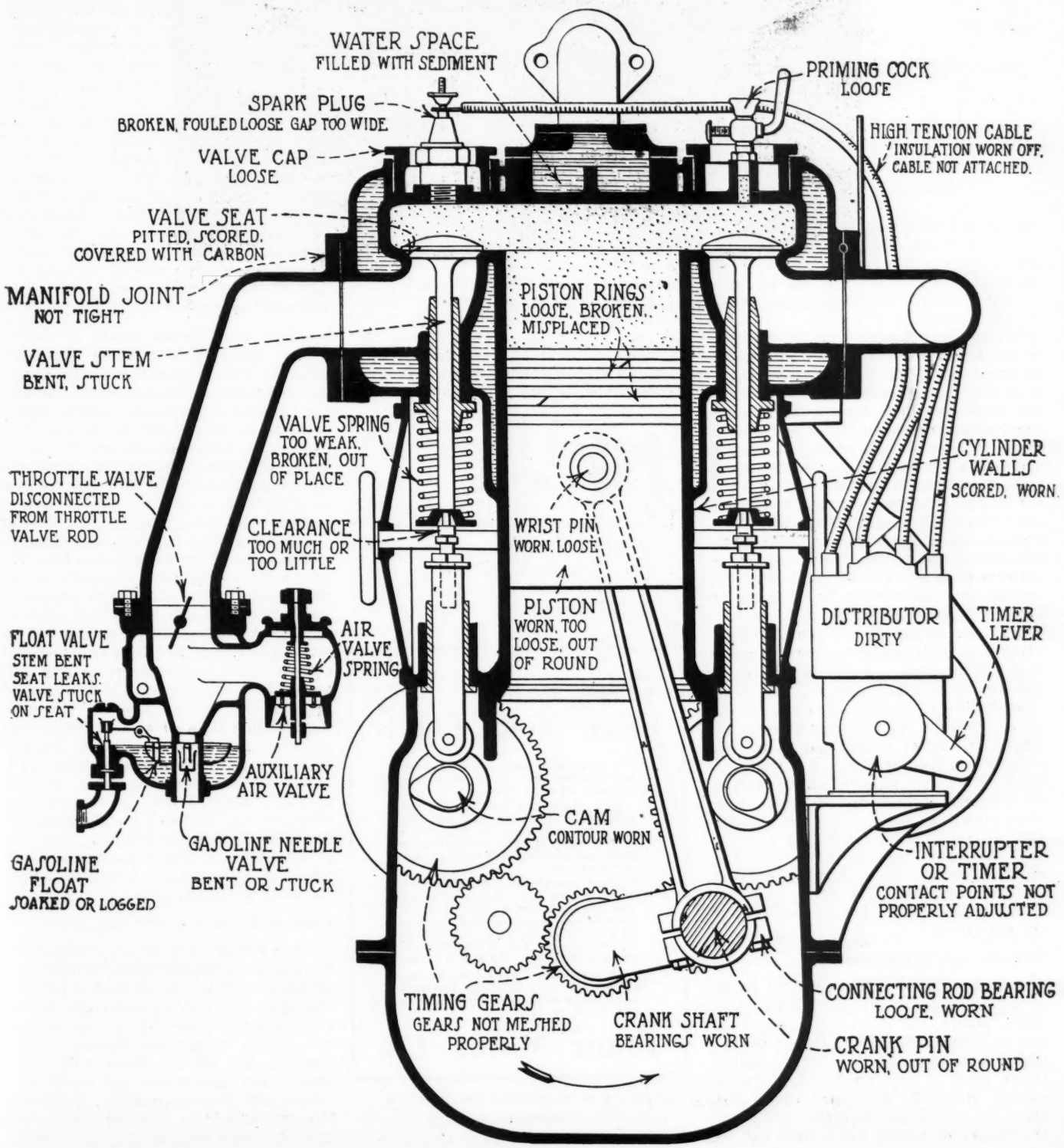




Engine Trouble Chart

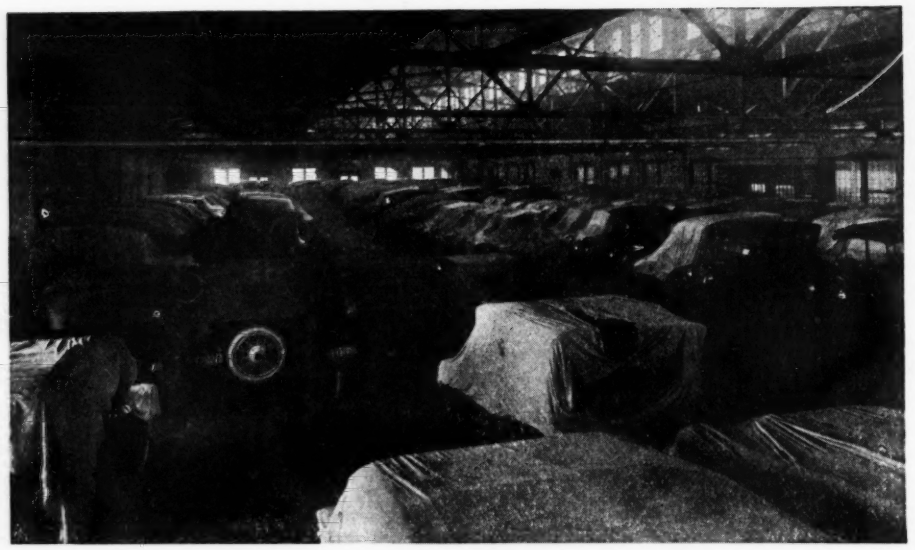
Repairman's Ready Reference for Shooting Trouble

The trouble chart illustrated herewith has been prepared for the repairman and presents in the most simplified manner possible a ference for readily detecting anything unusual. The T-head type of engine is chosen because it lends itself readily to illustration, and permits all the parts to be shown in one sectional view. With the aid of this chart and a systematic method of analysis such as is outlined on the following page, the repairman will have little trouble in diagnosing an engine's trouble. It is well to bear in mind that engine knocks occur at either crankshaft speed or camshaft speed, and that these knocks can be traced to loose main bearings, crank pin bearings, wrist pin bearings, and in the case of a piston slap to a loose fitting piston. Then there are the camshaft bearings which may produce knocks, but at one-half the speed of those just mentioned. Each of these knocks have there own particular characteristic sound and once the repairman has familiarized himself with what to expect from any of the above conditions, the hit or miss style of shooting trouble may be abandoned for the more desirable method of certainty. Referring to the chart, it will be seen that every part of the engine and what might be wrong with it is noted.



Storing Cars for Winter

Chance for Dealer to Get In On This Phase of Winter Service



How the Harrisburg-Overland Co., Harrisburg, Pa., takes care of its storage cars. The building is steam heated, well ventilated and every car is on jacks and covered

THE modern tendency is for automobile dealers to encourage car owners to keep on driving through the winter. It is working out well in the larger cities, where we have the street cleaning department and heavy traffic to keep the ways open, but in the rural districts, or where the winter is long and the snow deep, conditions are different. Car owners in such sections generally prefer that their cars hibernate after November. Even in many of the larger cities there are owners who cannot be induced to keep on driving. Therefore, it is pretty certain we shall always have plenty of cars to store in some shape or other. Where an owner has a good private garage, he will probably store the car in it. Other owners prefer the dealer to take the car and put it in storage.

Regardless of whether the owner is going to store his car privately or with the dealer, the latter should get in on the proposition, because about as much work must be done on cars which are stored as those run all winter. It is not sufficient merely to drain the water system, jack up the wheels and throw a cover over the whole job and then forget the car till spring. A car can become defaced and worn as much in dead storage as in a season's use if the proper precautions are not taken.

Must Prepare for Storing

Many owners do not know what to do to a car preparatory to storing, and that's where the dealer can come in and either get the man to let his car be taken to the former's place, or the dealer might send a man up to the owner's garage to do the necessary things for him. He might, for instance, point out the danger of letting the battery get so low in gravity that it will freeze and suggest that it be put on a slow charge now and then at the dealer's. The hemp packing, etc., of the pump, in the water system will dry out after remaining idle all winter and there are hosts of other things which must be looked after in the spring, when the car is again put into use.

Neat Inspectors Sell Service

Going to Store Your Car?

If you have made up your mind not to drive this winter let us help you lay up your car.

How about the finish? Are you going to let moisture and cold ruin it? Our storeroom is kept at a proper temperature, ventilation is good and everything is done to protect your car.

What about your battery? Don't let it stand idle; action goes on just the same and in the spring you may be minus a good battery. Let us preserve it for you. We charge it periodically and when you resume driving your battery is ready

At any rate get our advice on laying up your car. Whether you keep it at home or in our storeroom, we can be of service.

Jones Motor Co.

Here is a suggestion for a newspaper advertisement regarding winter storage

All of these things should be pointed out to the owner, with the suggestion that the car be stored with the dealer, so that when spring comes the car can be gone over and the small details attended to, that it will be in first class condition. A definite delivery date might be set so that if the owner wants the car on April 1, it will be ready for him on that date.

Cars which are brought in for storage should be worked on as soon as possible and put into shape for standing idle. The storage space naturally should be as dry as possible. The top floors generally make the best storeroom, but unfortunately, the basements of many service stations are used and it is in these that extreme care is necessary, as rust will get in its work very soon if not guarded against. So far as possible the storeroom should be kept at a uniform temperature, say 60 deg. Violent changes in temperature should be avoided, as it is bad for the finish on cars. A cloth or paper cover should be thrown over each car and the car's weight taken off the tires if they are left on. This can be done by providing a number of small wood horses which can be slipped under the front and rear axles.

What to Do to a Stored Car

When you get in a car for storage, here is what you should do to it. First, wash off all accumulations of mud, dust, etc., with soap and water. Never put the car away without doing this, or the varnish will suffer irreparable damage. After washing, dry off the water with a soft sponge and then polish the whole body with a soft chamois leather. Particular attention should be given to corners and crevices where water might lodge. Bright

sunlight causes varnish to crack, so be sure that the car is stored where it is dark, or at least throw a cover over it. This also helps to keep out dust.

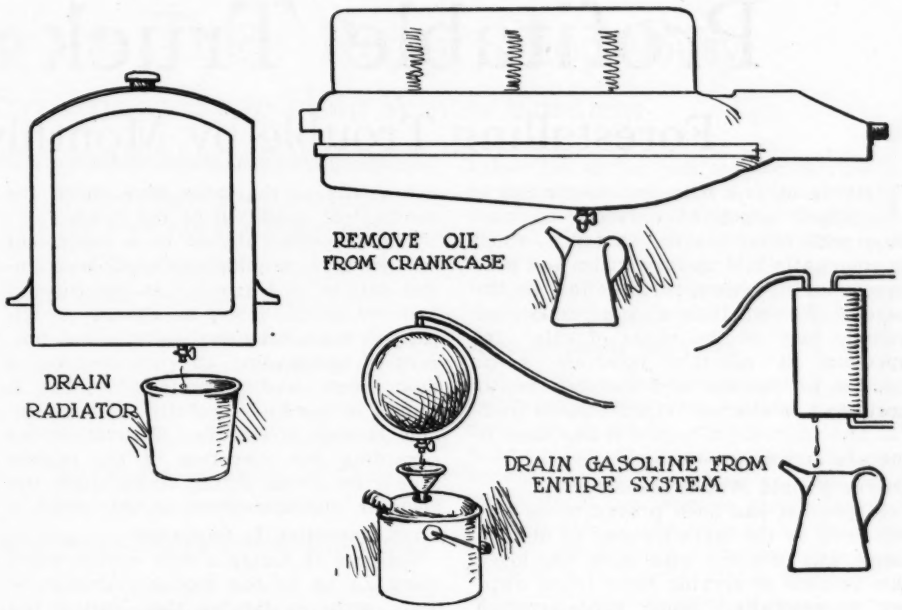
Standing for a long period in a folded condition, the top is apt to get creased and damaged. So, when storing the car, put it up, thus allowing it to remain smooth. Dust the top well before covering it, and if it is leather give it a light coat of boiled linseed oil. If pantasote, clean it with lukewarm water and castile soap. Put the side curtains on, too, after they have been cleaned. This will give them a chance to straighten out and help keep the upholstery clean.

Sponge off the upholstery with a solution of one part of pure ammonia to nine parts of water, then rinse with clean water. This will remove the dirt. After it is dry, buff it with a soft woolen rag. A good leather dressing applied at this time will add to the looks. Never use gasoline in cleaning leather trimming.

All the nickel-plated parts, such as the lamp rims, steering wheel spider, dash instruments, levers, etc., should be cleaned and polished with metal polish. A thin coat of vaseline should then be applied over the bright surfaces, to prevent rusting. Do the same with exposed parts of the powerplant, such as the magneto coupling, spark and throttle levers, etc.

Watch Storage Battery Carefully

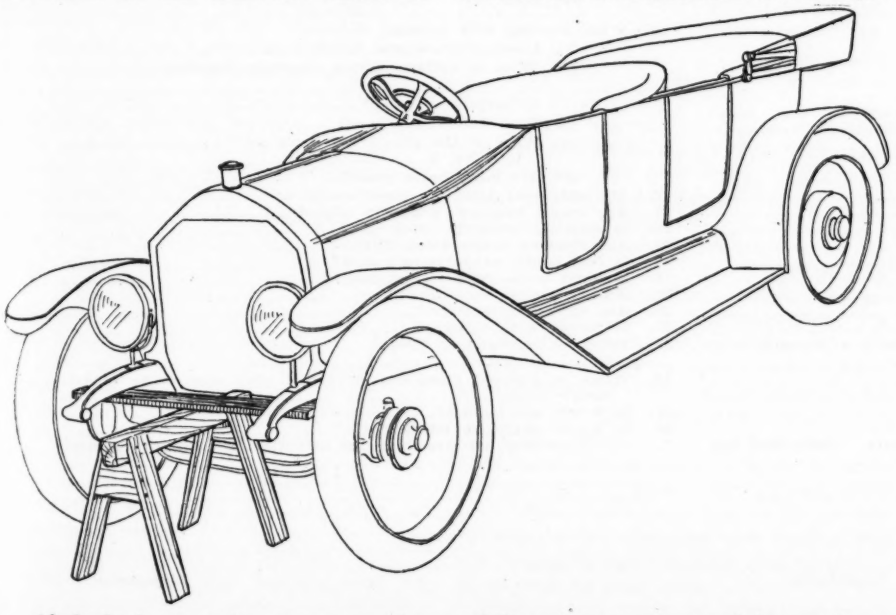
The most important things to watch in regard to the car's mechanical makeup are the storage battery and cooling system. Of course if the battery is removed and stored dry, as told elsewhere in this issue, there is nothing more to fear. But if an owner's car is being prepared for storage in his own garage, and he does not wish the battery taken out, be sure to disconnect the terminals of the battery. This is a precaution to keep it from discharging, as any slight leak in the wiring would discharge the battery and the latter might freeze up. Do not run the engine when the battery is disconnected, as the generator might be burned out. Put plenty of vaseline on the terminals of the battery and fill the cells with distilled water, if necessary.



Some of the essentials to watch when a car is put up for winter

Every six weeks or so a battery should be given a slow charge, either by taking it to a service station or running the engine and letting the car's own generator do the work. But it is a job sometimes to get an engine started in cold weather to say nothing of having to fill the water system, gasoline tank, pour oil into the crankcase, etc., and all for the sake of giving the battery a little boost. Thus, it is far better for the dealer to keep the battery in his own place, where it can periodically be inspected, or stored dry.

Repair Estimates Sell Service



Method of supporting car on one horse while springs are removed for repairs

All water must be drained from the system, taking care that small pet cocks on the pump, jackets, etc., are all turned open. Then the radiator and jackets should be washed out with a hot soda solution. Leave it in for several hours and then drain it, flushing with clean water. To make sure all the water gets out, run the engine for about two min. after all the water apparently has run out. If the hose connections are old, take them off and stuff rags into the radiator and jacket openings. New ones should not be put on until spring.

Old oil should not stay in an engine, especially nowadays, when it will be diluted with gasoline.

Drain off the old oil and wash out the crankcase with kerosene, running the engine about half a minute or so. Then put in a little fresh oil and run the engine a short while to insure a good film of oil over all the working parts.

Gasoline System Needs Attention

The gasoline system needs attention. Drain off all the fuel in the main tank and take out the supply pipe and force a length of soft iron wire through it to remove any foreign matter. Take the vacuum tank apart and clean the strainers, etc. After draining the carbureter bowl put back the supply pipe.

If extra precaution is to be taken with the tires in storage they should be taken off the rims and washed off. All bad spots should be vulcanized and the small holes filled with putty. Give all the tires a good coat of talc or mica. One of the best ways to care for tubes is to put them into the casings and put just enough air in them to round them out. Put plenty of talc or mica on the tubes too. Place the tires on top of each other and and cover them with burlap or some similar material. If the rims are rusty give them a coat of rim paint. Store the tires where the temperature is about 50 or 60 deg. and where they will not be exposed to strong light or the action of oil.

Profitable Truck Service

Forestalling Trouble by Monthly Inspection

THE truck is a business vehicle and is judged largely by economic comparison with other trucks. A truck which is constantly laid up for repairs is a poor investment. Improper attention to the care of the vehicle or an inherently poor vehicle may be the cause of this. Inspection at monthly intervals keeps trucks in service and reduces repair costs to a minimum. It anticipates trouble and corrects it before it has time to mature and cause damage.

Driver Should Watch Inspector

Inspection has been proved to be satisfactory by the large number of distributors and dealers who have employed this method of serving their truck owners successfully. Some predetermined plan must be put in force so that both the owner and the distributor will secure the maximum results from such an inspection. Then some type of form must be developed which will show the mechanical condition of the truck and be educational in its nature for the benefit of the truck owner. Such a form is shown below. If, during the course of the inspection, it is found that something serious is developing in the truck, due to neglect, then the inspection report can be accompanied with a letter giving detailed inorfmation as to how to prevent the recurrence of this trouble when the truck inspection report is mailed to the owner.

Insist that the owner have his truck operator present during the inspection. Thus the inspection can serve the dual purpose of being educational to the truck driver and at the same time check the mechanical condition of the truck.

The inspector should be a competent service man familiar with all mechanical details of a truck. At the time of delivery of the truck he should accompany it, explaining to the driver the dangers of overloading and overspeeding a new truck, and warning him that it should be handled carefully until the engine is well broken in. General advice regarding the operation of the vehicle should be given, laying stress upon the peculiar characteristics of the truck.

First Inspection Is Important

Dangers of racing a cold engine when warming up in the morning should be dealt with, explaining that during the night the cylinder walls of the engine have been drained of lubricating oil, due to standing, and that racing the engine is liable to score cylinder walls and pistons. An engine will warm up just as fast when idling as when racing, and will not be nearly so likely to pass the unburned portions of the fuel into the crankcase and dilute the oil. Emphasis should be laid upon the fact that the amount of unburned fuel passing the pistons and diluting the oil is at its maximum when the engine is cold. A little precaution here saves changing the oil so often, especially in cold weather. Start the truck right.

The first inspection a new truck receives is an important one. If the inspector is on his job he will be able to tell just how thorough the driver has been in the care of his truck, and this is an important bit of information for the distributor, as he will be in a position to tell the owner that his driver is or is not up to the standard that he must employ in order to have the truck deliver satisfactory results.

Inspections Reduce Trouble

The advantage of these inspections is that they reduce trouble to a minimum by locating any defects which may develop before they become serious enough to cause any real damage. Sufficient space should be left at the bottom of the form to permit the inspector to make a statement regarding the lubrication the truck has received, and also any suggestions which may be beneficial to the concern operating the truck.

All reports should be made in duplicate, one to be mailed to the truck owner and the other to be retained for the distributor's file.

Various means are used in covering the expense of these inspections. Some concerns charge for the labor and material used, while others charge only for the material, provided the truck is delivered to their service station. Some have worked cut a definite schedule and have divided their territory into zones, the charge for inspection increasing as the zones become farther away from the central service station. In the latter case the inspector's time, the material used and the transportation for the inspector to any one zone must be considered. From the experience of previous inspections, it would be possible to work out and adopt a standardized inspection.

Monthly Truck Inspection Report

Owner ..... Date .....

Engine No. ..... Model ..... Mileage .....

1. Is radiator full.....
2. Is anti-freeze required?.....
3. Is fan belt tight?.....
4. Is water hose in good condition?.....
5. Are all water joints tight?.....
6. Are crankcase to frame bolts tight?.....
7. Is carbureter adjustment correct?.....
8. Are gasoline screens clean?.....
9. Does carbureter choke properly?.....
10. Is compression good?.....
    Cyl. No. 1....., 2....., 3....., 4.....
11. Are valves properly adjusted?.....
12. Should valves be ground?.....
13. Should carbon be cleaned?.....
14. Has engine normal power?.....
15. Does governor operate properly?.....
16. Is crankcase oil up to level?.....
17. Should oil be changed?.....
18. What is oil pressure, motor idling?.....
19. Are ignition breaker points clean and properly adjusted?.....
20. Is distributor board clean?.....
21. Are spark plug gaps correct?.....
22. Does clutch brake work properly?.....
23. Is clutch action smooth?.....
24. Name any points which show that proper lubrication has been neglected .....
25. With starting and lighting system:
    (a) Commutators and brushes clean?.....
    (b) What is voltage across generator brushes?.....
    (c) Is battery watered?.....
    (d) Are connections good.....
    (e) What is the gravity of each cell?.....
    Cell No. 1....., 2....., 3.....
    (f) Are lamp bulbs good?.....
26. Are universal joints in good condition?.....
27. Are wheel bearings properly adjusted?.....
28. Is steering properly lined up?.....
29. Are steering connections tight?.....
30. Is foot brake properly adjusted?.....
31. Is hand brake properly adjusted?.....
32. Should brakes be relined?.....
33. Are spring clips tight?.....
34. Is torque arm tight?.....
35. What is condition of tires?.....
36. What is general condition of truck with regard to cleanliness? .....
37. Is truck overloaded?.....How much?.....
38. Is truck operated intelligently?.....
39. Are there any matters requiring attention not already covered?

Signed..... Distributor.

By..... Inspector.

How to Keep the Truck Repair Shop Busy

Sell Service Systematically to Hold Winter Business

TRUCK service is somewhat different from passenger car maintenance in that there is the element of business economy entering into the problem. Nearly all trucks are employed in industrial effort where time is a vital factor. This fact has necessitated the development of rapid means of repairing trucks when the occasion arises, as a loss in time may mean considerable to a business institution.

Most traffic managers would rather have a reliable service station at their command than attempt to maintain a complete repair department of their own. A service station can afford to carry a much more complete stock of repair parts than an individual business shop and can also maintain a more complete group of repair mechanics, as it has the work necessary to keep an organizatoin busy. Arrangements can be made with trucking concerns to get their work so that there will be no slump in business.

The truck service manager should bear this fact in mind and try to get his work arranged so that he can keep his organization intact. One of the great troubles in the past has been the slump in winter business, making it economically necessary to lay off some of the mechanics due to lack of work. This period of slackness in the shop can be overcome, providing the management will make some attempt to sell service and lay out a definite program of the amount of work its shop can do in each week, and then go out and sell this amount of business to its customers, and in so doing arrange a complete repair schedule.

Analysis of Past Work Necessary

By examining the service records for the past few months one can determine approximately the number of jobs the shop can handle a week with a given personnel. This gives one the data necessary to find out how much work must be scheduled ahead to keep the organization intact and avoid running the shop at a low profit over this period.

The service manager should lay out a chart covering the months which experience shows to be the time when the repair business is at its lowest ebb. This gives an accurate knowledge of the business that the service department must sell in order to keep its organization busy. After knowing the amount of business one must have, the next step is to get a line on the condition of the customers' trucks and find out those that are going to require mechanical work to put them into good serviceable condition.

There are a number of ways of getting information regarding the condition of customers' trucks:

1. By talking with the drivers.
2. By observing the performance of trucks on the streets whenever possible.
3. From the monthly truck inspections.

1—Know how many trucks your repair show can handle per week

2—Layout chart for winter service selling campaign

3—Knowledge of mechanical condition of customers trucks is sales ammunition

4—Cash in on truck inspections

5—Prepare the shop to handle winter business efficiently.

Truck drivers are usually well posted on the condition of their trucks and others that may be operated by the concern for which they are working. Whoever has charge of selling repair business for the winter should take advantage of every opportunity to talk with the drivers, as one can gather a lot of valuable pointers. When the service man sees one of his trucks on the streets which does not appear to be in the best of condition, he should make a note of it, as this truck is a repair possibility for the winter. Talk to the driver if possible and get as much information as possible and get as much information as concern operating it intends to have anything done to it in the near future.

Monthly Inspections a Good Idea

Practically every truck service station makes monthly inspections of its customers' trucks. This data gives another source of information regarding the customers' trucks. Perhaps one of the inspections may be made complete enough to warrant the service station furnishing an estimate on how much it will cost to put the truck in serviceable condition. The principal idea is that before one starts out to sell service to his customers he should have all the ammunition it is possible to collect.

Now that one has all of the data that can be secured to assist in selling service, perhaps the best thing to do is to pave the way by a letter setting forth the idea to the customers of having the trucks overhauled at the time when the shop is least busy. This condition may also apply to the customer's business and it will start him to thinking about the feasibility of such a proposition.

Sell service by personal calls. Make an appointment with the customer. Don't drift in on him unawares. Make it a business meeting pure and simple. In nine cases out of ten if you know what you are talking about you can sell service. The truck operator will readily appreciate the situation and realize you are trying to do something for his benefit as well as your own.

Promotional work in educating truck operators to get their trucks repaired before the spring rush may be carried on by correspondence and service advertising in the local newspapers. Don't underestimate the value of an advertisement now and then, as it will attract attention and let the truck public know that a service station is wideawake.

Must Be Ready for Work

To back up the winter service selling campaign, the service station must be prepared to handle efficiently the work it has sold. At the same time that the selling chart is being filled up with winter business, the service station should be prepared to take care of its contract work without delay. The first essential to be able to handle winter business is to carry a complete stock of repair parts, so there will be no lost time in handling the vehicles in accordance with the schedule which has been previously arranged. This does not necessarily mean that a company must carry an exorbitant stock, but rather a stock of active parts which ar ethe parts for which there is the greatest demand. It is easy to load up a stockroom with a lot of parts for which it will have no use when replacement orders are based on the strength of a fictitious demand.

All orders for replacement of stock should be based upon the result of sales experience. If a stockroom desires to carry a 60-day supply of parts on hand, it should establish the danger limit on a number of parts to be carried in accordance with the amount of sales it has made over this period. Providing a stockroom is located so that the transportation facilities between it and the source of supply are adequate, it should not carry more than 60 days' supply of parts on hand, as this will keep the investment which the stockroom represents down to a minimum, and enable it to turn this stock over five or six times in the course of a year's business. This enables the stockroom to make the greatest percentage of net profit on the investment.

Accurate Records Necessary

Naturally, accurate records are essential in order to carry out this plan. The orders on the factory for parts should be placed so that the stockroom can take advantage of the cheapest means of transportation, and by means of the statistics compiled from these records, have the stock flowing into it constantly.

Other means have been devised to steady the repair load. Among these is the unit replacement principle which enables the customer to have complete unit, such as engines, gearsets, axles, wheels, etc., available in case of damage to a similar unit in his truck. This means a great saving in time, as, for example, if a truck burns out an engine bearing, it is driven into the service station and in a few hours' time a replacement, or rental

(Continued on page 85)

Care of Pneumatic Truck Tires

Application in Fitting Them to Rim Practically Same as on Passenger Cars

THE best method of applying pneumatic truck tires follows, in general the accepted method of applying pneumatic passenger car tires. The pneumatic truck tire, however, is larger and heavier than the passenger pneumatic, has stiffer beads, and therefore requires more strength and heavier tools to apply it.

An important thing which is frequently overlooked in the application of pneumatic truck tires is the thorough inspection of the inside of the tire before inserting the tube. Make sure that no dirt, little stones, or perhaps a valve cup have dropped in the tire. Any foreign substance in the tire will cause trouble if left there. Make sure also that there are no thread ravelings, and that the lubricator has not caked on in heavy spots.

The tube should be inflated to see that it does not leak, and to make a closer inspection of chafing places than could be given if the tube were not inflated. Tighten the valve nut down firmly, but not enough to pinch the rubber, which might be cut by the ring washer. This risk is not incurred when the tube is inflated inside the tire.

Lubricate the Tube

Lubricate the tube with soapstone or powdered graphite, using a small amount and sprinkling it on that part of the tube which comes between the beads of the tire. Then with a cloth or brush spread the lubricator evenly along the sides of the tube. Do not use a lubricator inside the casing, and remember to use it sparingly on the tube. Too much sticks, cakes, and does more harm than good.

Deflate the tube. To do this, remove the valve inside, lay the tube down on the floor and place the tire squarely on it. The even pressure caused by the weight of the tire quickly deflates it. Then, reapply the valve, taking care that it seats perfectly.

After this has been done, put the tube in the tire, placing it evenly about the tire and making sure that it is not twisted. Get just enough air in the tube to round it our firmly, but not enough to expand the beads of the tire.

Next, insert the flap. The flap must be evenly distributed around the circumference of the tire. It may seem at first to be too short, but if smoothed out firmly it should lie so its base is in line with the base of the beads of the tire.

Inspect the rim carefully before mounting the tire upon it. Remove pieces of rust or dirt. See that the side and locking rings are in good condition, and that the locking ring slot has not been dented in by pounding. Put the inside ring on, making certain that the smoothly curved side of the ring will come in contact with the bead of the tire when the tire is mounted. New types of rims have one permanent side flange affixed.

THE PROPER CARE OF TIRES

Self-interest dictates to the truck owner that his tires be given good care. Just as neglect and abuse will wear out powerfully built steel machinery, so will it wear out a tire—long before the tire has given full service. To fail in this care of the tire is bad practice from a business viewpoint. Truck tires represent an investment of capital and careless use of them is throwing away money, not compatible with present day business principles.

1—See to it that minor injuries to your tires are given prompt attention. Heal tire cuts while they are still small with tire putty and patching cement. These tread cuts grow quickly if not mended.

2—Oil and grease are destructive to rubber. Splashes of these on your tires should be wiped off with a cloth moistened with gasoline. Do not permit your tires to stand in gasoline which may have collected on the floor of the garage.

3—Protect a broken spot in the casing from further strain by inserting a cord patch. It will aid you in getting the full allotment of mileage from your tire.

4—Guard against the strains and bruises which come from driving in car tracks or backing against the curb. Check your wheels for alignment, or have them checked at a truck tire service station.

By far the most important thing in the care of tires is the proper inflation. A too heavy burden ruins and crushes down the wall of any tire. Have your tire-inflation adjusted to the load. Test inflation daily. Use a pressure gauge. You cannot tell whether a tire is sufficiently inflated by feeling it or kicking it.

If vou do not maintain your own wheelwright shop have a working arrangement with a good wheelwright who is in a position to give night service by appointment. Truck owners cannot afford to lay up their trucks during the day and are appreciative of night service.—Goodyear Tire & Rubber Co., Akron, Ohio.

Seven Steps in Applying Pneumatic Truck Tires

FIRST—With a small pneumatic tire it is customary first to insert the valve of the tube through the valve stem hole of the rim, and then to pry and pound the tire over the rim. This method cannot be followed with a pneumatic truck tire because of the stiffness of the beads and the width of the rim. Instead, you first lay the tire squarely on the rim with the valve stem over the valve stem hole of the rim.

SECOND—Allow the tire to drop down evenly until the valve stem is reached, then press the valve stem down sideways and toward the end of the flap.

THIRD—Hold the valve stem in this position with a thin bar, taking care when the tire slips down the rest of the way that the valve stem does not catch in the locking groove. During this operation a valve cap should be put on the valve stem to protect the threads. New types of rims are being made which have valve stem slots to facilitate application of tire.

FOURTH—When the tire is completely on the rim it can be readily turned from one side to the other until the valve stem appears at the valve stem hole and can be pulled through. Next the rim nut should be screwed on the valve stem until the valve is fastened securely in the center of the valve stem hole.

FIFTH—You are now ready to put on the second side ring, which will slip over the rim easily if too much air has not been put in the inner tube. By means of a large tire iron, force the side ring down into place all the way around the tire. You should now be able to insert the hooked end of the locking ring into the locking ring hole. Continue to press the side ring down and at the same time fit the locking ring into its channel.

SIXTH—Care should be taken not to spring the locking ring during this operation. When mounting the 42 by 9 and 44 by 10 size it will be necessary to pound this ring somewhat before entering the channel. Be certain that the locking ring has sprung into place around its entire circumference.

SEVENTH—The tire is now ready for inflation. Remember, under-inflation ruins tires, so avoid this risk. To mak sure that you are using the proper inflation pressure for the load the tire is to carry, consult the inflation chart, and use pressure gage when inflating the tire. Never run a tire flat or very much deflated—it means ruin. Also guard carefully against overloading. Above information applies to Goodyear tires.

Tire and Rim Sizes

Motor Age Maintenance Data Sheet No. 61

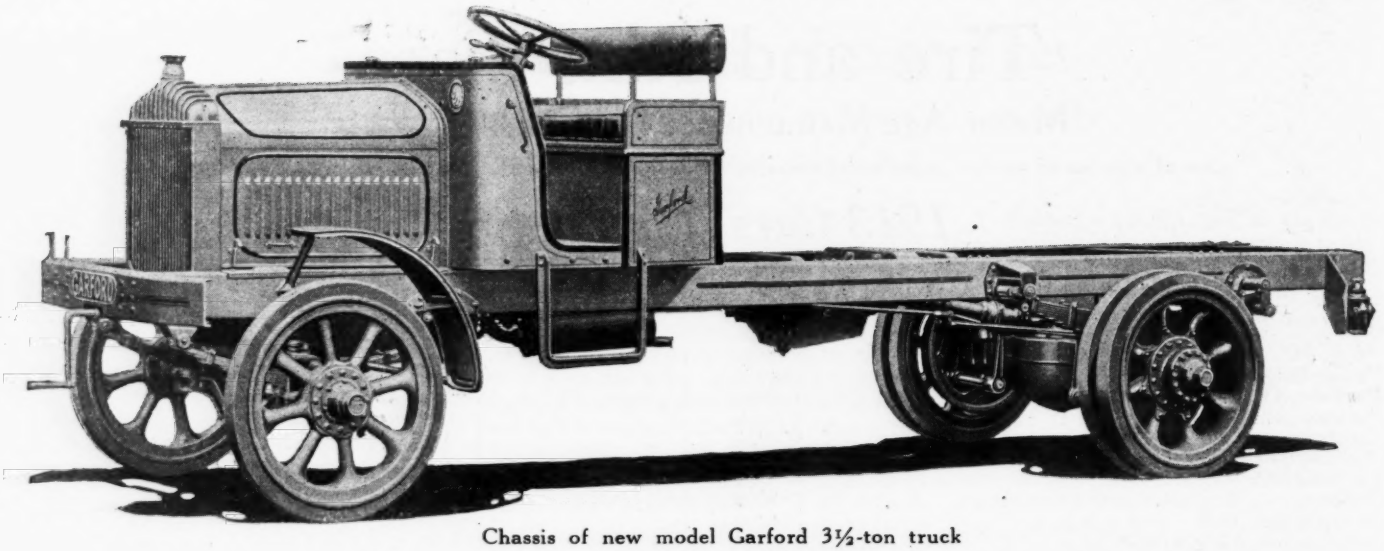
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1913 Cars (Continued)

CAR AND MODEL	Make of Tire	Size of Tire	Style of Bead	Type of Rim	Make of Rim
Paige, 36		34x4		S. S.	Detroit
Palmer-Singer		36x4			
Paterson, 43		34x4		Demountable	
Paterson, 47		36x4		Demountable	
Pathfinder		36x4			
Peerless, 38-6 & 48-6		36x4½		Q. D.	Universal
Peerless, 60-6		38x5½		Q. D.	Universal
Perfex		32x3½			
Pierce-Arrow, 38 C		36x4½		Q. D. C.	Goodyear
Pierce-Arrow, 48-D & 48-B		37x5		Q. D. C.	Goodyear
Fierce-Arrow, 66-A		38x5½		Q. D. C.	Goodyear
Pilot, 50		36x4		S. S.	Stanweld
Pilot, 60		37x4½		S. S.	Stanweld
Pope-Hartford, 31 & 33		36x4½			
Pope-Hartford, 29		37x5			
Pratt, 30		34x3½		Demountable	
Pratt, 40 & 50		36x4		Demountable	
Premier, W-6	Opt	37x5	Opt	Q. D.	Firestone
Premier, 2	Opt	36x4½	Opt	Q. D.	Firestone
Pullman, 36		34x4			
Pullman, 44 & 66		36x4		Q. D. R.	Universal
Rambler, Cross Country		36x4			
Rayfield, C		34x4			
R. C. H.		32x3½		Demountable	
Reeves, Sextoauto		34x4½			
Regal, T & N	Morgan & Wright	32x3½			
Regal, C & H		34x4			
Reo, R & S		34x4	S. S.	Demountable	Stanweld
Republic, D		36x4			
Republic, E		36x4½			
Richmond, O		34x3½			
Richmond, P		36x4			
Saxon		28x3		Clincher	Mott
Schacht		36x4		Demountable	
Schlosser		36x4½			
Selden, 48		36x4		Demountable	
S. G. V., A		34x4		Q. D. C.	
S. G. V., D		35x4½			
Simplex, 127 & 137		35x5			
Simplex, 129 & 139		36x5			
Spaulding, G		36x4		Demountable	
Speedwell		36x4½			
Spoerer 40 C		37x4½			
Spoerer, 25 A		35x4			
Staver, 45		34x4			
Staver, 55		36x4			
Staver, 65		37x4½			
Stearns, SK-4	Firestone	36x4½	Clincher		Firestone
Stearns, SK-6	Firestone	37x5	Clincher		Firestone
Stevens-Duryea, C		37x4½		Q. D. C.	
Stevens-Duryea		37x5			
Stoddard-Dayton, 30		34x4			
Stoddard-Dayton, 38		35x4½			
Stoddard-Dayton, 48		36x4½			
Stoddard-Dayton-Knight		36x5			
Studebaker, AA-35 & E-6	Goodrich	34x4		Q. D. Clincher	Kelsey
Studebaker, SA-4	Goodrich	30x3½		Clincher	Kelsey
Stutz 4 & 6		34x4½		S. S.	
Thomas, 6 46		37x5		Q. D. C.	
Touraine		36x4		Demountable	
Triumph, A & B		36x4			
Velie, Dispatch		34x4			
Velie, 32		34x3½			
Velie, 40		36x4			
Warren, 6		36x4½			
Westcott, 4-40	Firestone	36x4	S. S. or Clincher	Demountable	Firestone
White, G, R, E		34x4			
White, G E, B		36x4½			
White, G, F		37x5			
Winton, 17-D	Standard	36x4½	Clincher	Demountable	Firestone
Zimmerman, Z-40		35x4			
Zimmerman, Z-6		36x4			

ABBREVIATIONS:

S. S.—Straight Side. Q. D. C.—Quick Demountable Clincher. Dem.—Demountable. Q. D. D.—Quick Demountable Detachable.



Chassis of new model Garford 3½-ton truck

Garford Adds Second 3½-Ton Truck

New Model Does Not Supplant Old One But Completes Line

GARFORD comes to the fore this month with another new model which will further round out its already extensive line. This latest Garford design is of 3½-ton capacity. It differs from the former 3½-ton model in that the motor is placed forward of instead of under the seat. The new model also establishes a new price standard for Garford, $3990.

The new model is not intended to supplant the former 3½-ton truck. Both will be available, thus affording two models from which to select; the one being of the conventional long wheelbase type, the other of the original Garford design with extremely short wheelbase.

The engine is of late design and featured with a detachable head, and cylinders cast in block. The crankcase is extended to include the flywheel housing, and the oil base is of two piece construction, permitting of easy removal. The crankshaft is of the three bearing type, having very long bearings, and the journals are also large in diameter. The shaft is made specially stiff to resist whipping. The cylinders are of close grained gray iron and, because of the block casting, the water passages are large, full passage being provided around all cylinders and valves.

Pistons are of gray iron provided with three rings. A special feature in connection with these pistons is the snap ring provided for preventing any movement of the piston pin. The piston pin set screw is of late design, insuring a positive means of preventing scored cylinders. The piston length is 6¼ in. The connecting rods are of drop forged steel I-beam section. The crank end is provided with four bolts. Upper and lower ends of the rod are symmetrical.

The timing gears are of helical form, having large sized bearings with the usual face width of 1½ in. The camshaft is a single piece, drop forged, with the eight cams integral. The cams are slightly offset from the valve lifters, because mushroom tappets are employed. The camshaft is of the type having enlarged journals to permit of removal from the case without disturbing the three bearings. The liters are retained in the case by means of a yoke which permits ready removal.

The oil system is of force feed type; a large gear type oil pump delivering oil under pressure to all bearings. The overflow from the pressure relief delivers oil to the timing gears. Before admission to the oil pump, the oil passes through a fine brass gauze, and so filters the oil. As far as possible the oil is delivered through steel tubes, thereby eliminating the possibility of its escaping through porous castings.

The clutch is of multiple disc type, having six pairs of plates. It is inclosed in a housing which matches the flywheel housing, thereby making it clean and durable. The clutch is provided with the highest grade ball bearings and all working parts are of steel.

The transmission is of four speed, selective sliding gear type; all gears and shafts are made of alloy steel, heat treated. The transmission is so made that a power drive attachment may be applied to it at slight additional cost.

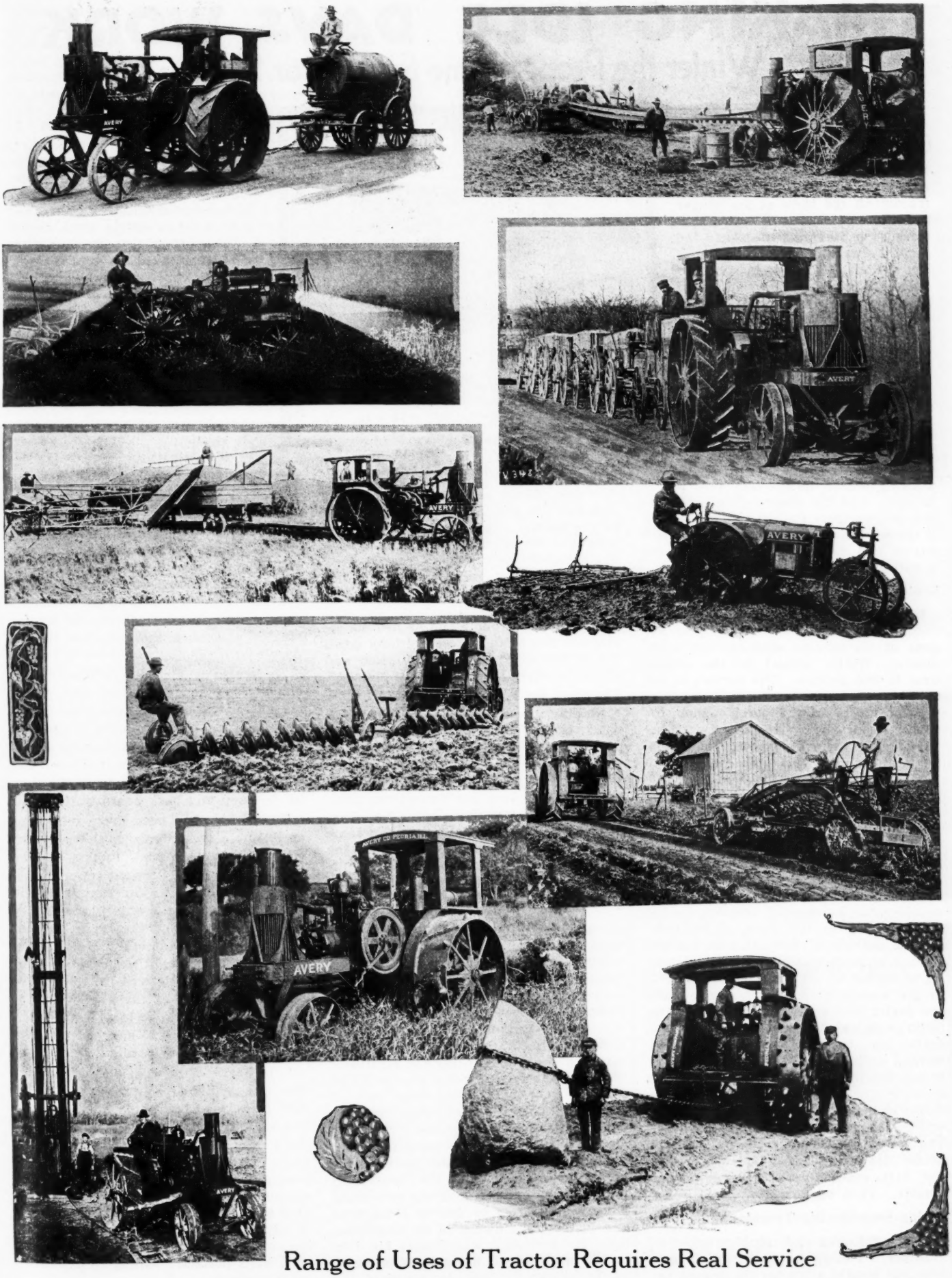
The front axle is of standard pattern, the I-beam center being drop forged in one piece, heat treated. The knuckles are of alloy steel, also drop forged and heat treated. The rear axle is of the worm drive type, having a removable worm gear. The bearing equipment of this unit is much heavier than in previous models. The axle is of the floating type, each wheel being supported on two bearings on tubular extension from the axle housing. The driving wheel brakes are of the double internal type, no external brakes being required. Its size, 21 by 3¾ in., is more than adequate for a truck of this capacity.

The steering gear is of the screw and nut irreversible type mounted ahead of the engine leg. The angular position of the column provides for a very comfortable position when driving. The hand wheel, 22 in. in diameter, is of the notched type. Steering connections from the gear to the front axle are of the ball and socket type and compression springs are provided at both ends of the rod.

Ignition is effected by means of a high tension magneto. The elimination of a secondary source of current greatly simplifies the wiring. The attachment of the electric generator and electric starter when these instruments are required is effected by bolting directly to the crankcase. The front springs are 42 by 3 in. wide and the rear springs 56 by 3½ in. These are entirely of alloy steel.

SPECIFICATIONS OF GARFORD 3½ TON

Capacity—7000 *lbs.*
Engine—4½x6-*in. bore and stroke, four-cylinder, with detachable head.*
Axles—*Timken.*
Frame—7-*in. pressed steel.*
Wheels—*Steel.*
Tires—*Interchangeable,* 36x5 *in.; dual rears.*
Radiator—*Tubular; cast tank.*
Wheelbase—132 *in. Loading space,* 12 *ft.*
Springs—*Full alloy, semi-elliptic.*
Bumper.
Flywheel enclosed. Clutch and crankcase forming a unit with the motor.



Range of Uses of Tractor Requires Real Service

MAKING IDLE DAYS WORK

Winter the Proper Time for Tractor Service



By Fred M. Loomis
(Motor Age Editorial Staff)

GETTING the tractor on the farm is only part of the dealer's business and obligation. It is his responsibility as well to get that tractor off the farm at the proper time to do repair and overhaul work so it will give its owner the service promised him and which he has a right to expect; in short, to make the tractor stay sold. And the proper time to do that service work is when the tractor is not being used, winter.

Perhaps the tractor dealer is in a more fortunate situation in regard to winter service work than his other automotive brethren. For the farmer is a pretty level headed business man in this day and age and no one realizes better than he that good equipment during the working season means increased profits to him. And the proper time for farmer's preparedness for the summer's work is the winter, when he is at comparative leisure and most of his farm equipment is entirely so.

Dealers Must "Wake Up" Users

But the dealer must make it his particular business to see that there are none of his patrons who are not wideawake. Winter should be the easiest time to sell service. The farmer is not using his equipment, so he will not miss it while it is in the service shop for winter repair work. He has received his payment for his previous year's crops, so he is in a good financial condition to have necessary work done. And the wideawake tractor dealer, who must now also be a tractor service man, should take advantage of these two conditions.

A certain dealer in Illinois, who now is in his second year as a tractor dealer, learned this by valuable experience. In his first year in the business he sold a considerable number of tractors in his vicinity. Up to the point of instructing his customers thoroughly in the operation of their tractors this dealer was all he should be. Not a machine was left to the manipulation of its owner until the dealer had assured himself that the latter was competent, not only to operate his machine when everything worked well, but also that he was able to do all the little service work necessary to counteract the ordinary troubles incident to the operation of a machine with which the owner was not acquainted. The result of this solicitude on the part of the dealer was that he got through his first season with a minimum of trouble. Then came winter.

Spring Sees the Big Troubles

Spring followed and troubles began to multiply. There was hardly a farmer who had bought a tractor the season before who did not experience more or less difficulty in getting things going right in the spring. Things which never had happened the fall before began to happen with bewildering rapidity. Nearly every tractor developed troubles which had not been apparent the season before. The dealer was kept on the jump day and night shooting trouble and he had his diplomacy put to the test smoothing down the ruffled plumage of disgruntled and angry farmers. What was the trouble?

Effects of Neglecting Repairs

Nothing much—at least nothing but what might have been foreseen and avoided very easily. In almost every case the tractor, after having accomplished its fall work more or less successfully, had been put into winter quarters just as it came from the field. It came out in the spring in the same condition it had been in the fall and the farmer was trying to meet the difficult spring conditions with a machine in no fit condition to undertake the task. The tractor actually had not deteriorated any during the winter, but none of the bolts which had shaken loose had been tightened, none of the adjustments had been gone over and all the evidences of wear and strain which had accumulated during the preceding season were left to develop their weakness unrestrained. Naturally, these speedily became worse under the renewed strains of the spring demands. Not a tractor in the lot had been overhauled. Not one of them was in the best of condition. Not one of them was competent to deliver anywhere near 100 per cent efficiency.

That dealer thought the matter over carefully and came to the conclusion that it was up to him to do something more than merely to deliver a machine and instruct the owner in its immediate use. He decided it was clearly his duty to his customer to bring such pressure as he might to bear to convince the latter of the necessity of having his tractor overhauled and put into good condition during the period when it was idle. Then it would be in proper condition to work efficiently when spring came around.

Preparatory to putting this idea across he fixed up his shop this fall, putting in such tools and equipment as would be needed for the thorough overhaul of tractors. Then, whenever he sold a machine, he tried to impress upon the mind of the buyer that in owning a tractor he obligated himself to give it proper care. This included getting it into the dealer's shop during the winter for a thorough overhauling.

Using Advertising for Winter Work

At the present time this dealer is reminding his customers of what he told them when they bought. He is advertising the necessity of winter overhaul and the facilities he has for doing that sort of work. He is laying stress upon the advantage of attending to this during the winter season when the farmer has no immediate use for his tractor and when the shop has time to devote to it.

He is also sending out personal letters emphasizing the same idea and urging his customers to take advantage of the opportunities he is offering them. He goes so far as to tell his patrons that if requested to do so he will himself see about getting the tractor from the farm to the shop and back again.

This dealer has been given merely as an example of recognizing the responsibility he owes his trade in this respect. The conviction is growing among tractor dealers that their function as sellers of tractors is not the only function they should perform, but that it is part of their job to see that every tractor they sell keeps in a condition to work. But they cannot do this without the intelligent co-operation of the owner, and it is necessary to interest his consideration by some such appeal to his good sense as the winter overhaul idea.

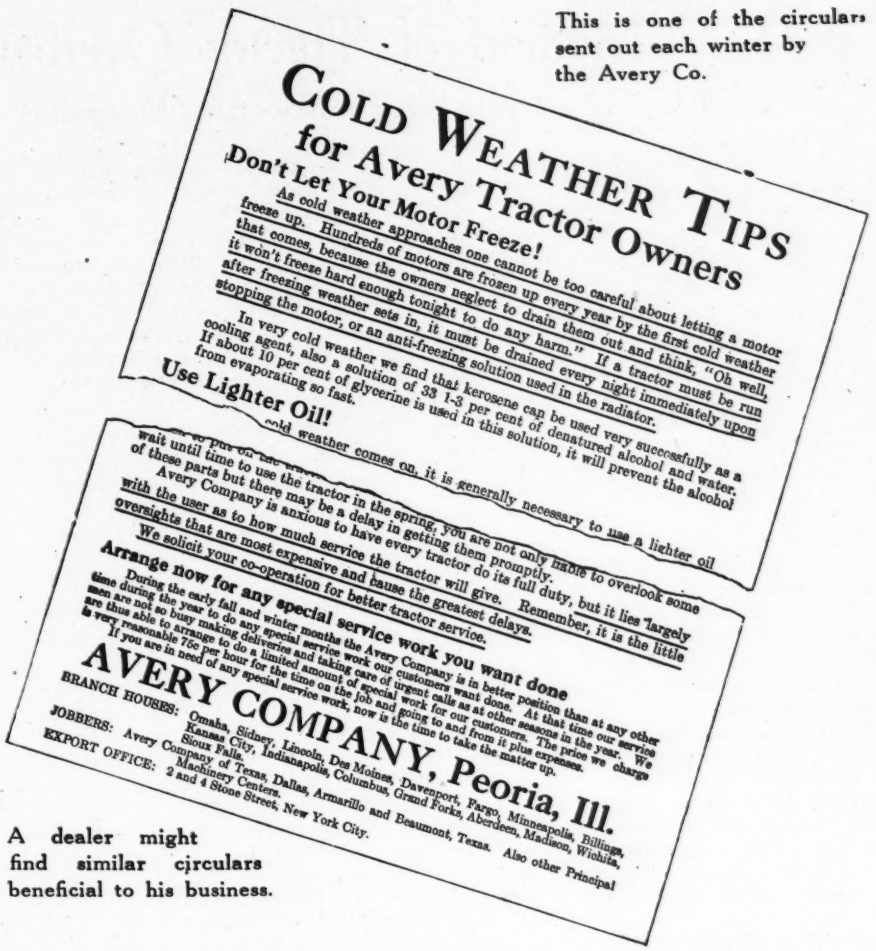
It is worth while considering the fact that this is not free service. It is the kind of service for which a charge can and should be made. The dealer is rendering a distinct service to his customers in insisting that they have their tractors overhauled and in providing the shop facilities for doing the work. This is the kind of service the farmer is quick to see is advantageous to him, that it is rendered for his individual benefit, and as such he is perfectly willing to pay for it all it is worth.

Immediately it will suggest itself to the practical dealer that some means must be provided for getting the tractor to and from the shop. In the case of the smaller machines this is met easily by the use of a motor truck, with which many tractor dealers now are supplied. The larger machines, if the distance is not too great, can come and go on their own power. It is not supposed that the tractors to be overhauled are actually disabled, at least not to the extent of it being impossible to move them. However, in case it should happen that one in such condition is encountered, it can be patched up on the farm sufficiently to enable it to get to the shop.

Of course it always will be possible, in extreme cases, to conduct the overhaul on the farm, but it is much better to do such work in the shop and the tractor should be got there by hook or by crook.

At this season of the year the dealer should prepare for this work. He can start an advertising campaign through the local papers, by personal letter and by word of mouth. Emphasis should be laid upon the economic importance of winter overhaul. There is everything to say in favor of it and nothing against it. The dealer who really realizes his responsibility in this respect will find his customers, for the most part, more than willing to avail themselves of the opportunity to insure the efficiency of their tractors. To the dealer, too, it must be plain how in this way he can increase his standing and reputation as a tractor dealer and at the same time save himself trouble and expense by forestalling the cause of tractor troubles.

This is one of the circulars sent out each winter by the Avery Co.



COLD WEATHER TIPS
for Avery Tractor Owners

Don't Let Your Motor Freeze!

As cold weather approaches one cannot be too careful about letting a motor freeze up. Hundreds of motors are frozen up every year by the first cold weather that comes, because the owners neglect to drain them out and think, "Oh well, it won't freeze hard enough tonight to do any harm." If a tractor must be run after freezing weather sets in, it must be drained every night immediately upon stopping the motor, or an anti-freezing solution used in the radiator.

In very cold weather we find that kerosene can be used very successfully as a cooling agent, also a solution of 33 1-3 per cent of denatured alcohol and water. If about 10 per cent of glycerine is used in this solution, it will prevent the alcohol from evaporating so fast.

Use Lighter Oil!

[illegible] cold weather comes on, it is generally necessary to use a lighter oil [illegible] wait until time to use the tractor in the spring, you are not only liable to overlook some of these parts but there may be a delay in getting them promptly.

Avery Company is anxious to have every tractor do its full duty, but it lies largely with the user as to how much service the tractor will give. Remember, it is the little oversights that are most expensive and cause the greatest delays.

We solicit your co-operation for better tractor service.

Arrange now for any special service work you want done

During the early fall and winter months the Avery Company is in better position than at any other time during the year to do any special service work on our customers' tractors. At that time our service men are not so busy making deliveries and taking care of special work for our customers. The price we charge are thus able to arrange to do a limited amount of special work for our customers. The price we charge is very reasonable 75c per hour for the time on the job and going to and from it plus expenses.

If you are in need of any special service work, now is the time to take the matter up.

AVERY COMPANY, Peoria, Ill.

BRANCH HOUSES: Omaha, Sidney, Lincoln, Des Moines, Davenport, Fargo, Minneapolis, Billings, Kansas City, Indianapolis, Columbus, Grand Forks, Aberdeen, Madison, Wichita, Sioux Falls.

JOBBERS: Avery Company of Texas, Dallas, Armarillo and Beaumont, Texas. Also other Principal Machinery Centers.

EXPORT OFFICE: 2 and 4 Stone Street, New York City.

A dealer might find similar circulars beneficial to his business.

This letter brought results to one dealer

Dear Sir:

You got ready for winter, didn't you? Then why not get ready for spring, too? It's just as important.

Getting ready means that every tool and implement you have shall be ready for work the minute you want it. You know, it happens a great many times that the weather in the spring is not the best and you have to do your work on the jump. If any of your tools is out of order, or if any one of them breaks down just when you want it the worst, you suffer a serious loss. Don't you know that? Sure, you do.

The most important thing you have is your tractor. Are you sure it's all ready for work? Let me make sure for you. Bring it to my shop, or let me go and bring it in myself. It's winter now and you don't need it for a while. Let me overhaul it for you and put it in the best of shape. Then when you give the crank a turn in the spring she'll be off and at work in a jiffy.

The cost of overhaul is a small item compared to what the loss of time or crop would be to you by having your tractor break down in the spring just when you need it most.

A tractor that is sure to work is the very best crop insurance you can have. See me about getting that insurance NOW.

I have the right kind of shop facilities and the best of skilled tractor men and I will do a good job for you.

The next time you are in town drop in and let's talk it over.

Yours very truly,

Here is an advertisement which brought results for one dealer

Shoeing Your Horses During Spring Plowing

Would be foolish, wouldn't it? Then why put off having your tractor overhauled and repaired until Spring? That is when you will need it most and can least afford to have it laid up.

Let us come and look over the tractor. Our shop will have plenty of time to make all necessary repairs before you need to use the tractor in the spring and we'll both be gainers.

DUNDEE MOTOR CO.

Method of Tractor Overhaul Outlined

Based Upon a Systematic Inspection Designed to Show Usual Troubles

In nearly all agricultural communities the motor car has preceded the tractor and has educated the farmer in the care of automotive machines. This to some extent has simplified the service problem, yet a great deal remains to be done of an educational nature. Proper instruction at the time of delivery of a new tractor will be a great aid in reducing the number of service calls. The farmer is well aware of the fact that much of the trouble is due to incompetent operators and usually welcomes instruction whether it be personal or in the form of a winter school.

The conditions under which the tractor has to work are different from those of other automotive machines, as the tractor when working is under constant load that is very near its maximum power, and probably the majority of days that it is in the field, the soil is dry and the atmosphere saturated with dust. This fine dust is extremely injurious to the machinery, and some provisions must be made in the design to protect both the engine and other working parts from its effects. To prevent the dust entering the engine through the carbureter, the air is strained or washed to remove any free particles which may be in it. This is also true of the breather pipes which lead to the engine crankcase, as it is important that the engine-lubricating oil be kept clean to prevent damage to the bearings.

Due to the deteriorating effects of the dust all parts such as the clutch, gearset, final drive, wheel bearings, etc., are usually inclosed as is the practice in motor car engineering. Tractors constructed on this basis are easier cared for and have a longer life. On account of the heavy work the tractor has to do the design of the prime mover and the principal units which make up the machine are perforce larger and stronger than those of the motor car or truck.

Dangers to Tractors

Overloading and overspeeding are liable to injure any machine, and great care should be taken when a tractor is new not to overload it or to increase the speed by tampering with the governor adjustment. Either one of these may cause more harm to a tractor when it is new than two years' service in the field. Therefore, it is essential that a new tractor be handled with care.

As a general rule tractors burn kerosene, due to its being a cheaper fuel, but nevertheless, it has its drawbacks due to the possibility of the unburned portions of the fuel passing the pistons of the engine and diluting the crankcase oil. This is more noticeable in engines burning kerosene or distillate, due to the higher temperature required, than in engines burning gasoline, and this condition is at its maximum when the engine is cold.

It is a simple matter to score a cylinder wall or piston at this time when the oil film between the two is practically disintegrated. This condition is accentuated by the fact that lubricating oil is heavier when oil is cold and therefore not as liable to fulfill its function as when the engine properly is warmed up.

Overhauling of tractors is based upon a systematic inspection to determine their mechanical condition. A general scheme for these inspections with the suggested repairs is arranged in the following outline:

Gives Outline for Inspections

1. ENGINE ADJUSTMENTS—Perhaps the most important item under this heading would be to test the engine compression, which can be done by turning the engine over by hand and comparing the compression in the cylinders with each other. If each cylinder compares favorably with the others then it can be passed as being in good operating condition. If one or more cylinders are found to be weak, the cause of this weakness must be located. This can be done by checking first the pushrod adjustment for proper clearance.

These clearances for the customary truck and tractor engine should be about 0.006 in. for the intake valve and 0.008 in. for the exhaust valve. However, if the pushrod adjustments prove to be standard and the compression is still weak, it probably will be necessary to grind the valves, first the exhaust, because it is subject to the most heat when in operation and is, therefore, likely to be in the worst condition. Providing the grinding of the exhaust valve does not cure the trouble, then the intake valve will have to be ground. A slight variation in the compression of engines also is to be expected due to the fit of the pistons and rings in each cylinder not being exactly the same as that of the other cylinders. At this time it is also an excellent plan to check up the clearance of the pushrods on the remaining cylinders to be sure they are all standard.

2. CLEAN CARBURETER, FUEL AND AIR STRAINERS. Drain the carbureter and remove the cover to the float chamber. Then clean the carbureter bowl and float so that any dirt and water which may have accumulated is removed. Now remove and clean the strainer at the entrance to the float chamber and at the same time test the flow of fuel from the tank to make sure that the fuel supply line is not blocked by obstructions. If the fuel flow is not equivalent to the size of the line, then remove it and clean the line.

If the fuel is not being supplied with sufficient rapidity when operating in the field, this can be noticed by frequent back-firing through the carbureter, although back-firing cannot be attributed always to a lack of fuel. Practically all tractors are equipped with an air strainer or washer to remove all dust from the intake air before it enters the engine. These are supplied with a form of traps in the air line so that the accumulations from the washed air can be removed. This should be cleaned thoroughly, and the same should be done with the strainer for the engine crankcase breather pipes.

3. CLEAN AND ADJUST MAGNETO. Remove the distributer board and clean the contact surface, using a small piece of No. 00 sandpaper if necessary to cut the dirt collected. The collecter ring brush should be removed also and the ring itself cleaned by turning the engine over and holding a clean cloth against the ring on the armature. Remove the cover to the magneto breaker box and clean the points. If the points are pitted, they can be dressed by a fine Swiss file. In doing this one should be careful that the points are lined up properly so that the faces of the points meet squarely.

It is not a good policy to file the points too much, as it wastes metal. It is better to remove the points and square their surfaces with a lightweight hammer providing it appears that filing is going to waste considerable metal. Now examine all wiring in connection with the ignition system and make sure that the connections are tight. Also see that the wires leading to the spark plugs are not worn through their insulation at any place so as to cause a short-circuit. This is most liable to occur when the wiring is inclosed in metal conduits. The proper spark plug gap adjustment for practically all makes of ignition apparatus is 1/32 in. and the erratic missing of an engine can be traced sometimes to the fact that the spark plug gaps are set too close.

4. ENGINE LUBRICATING OIL. As stated before, the heavy-fuel engines are most liable to have trouble with the dilution of the crankcase oil with gasoline and kerosene. Lubricating oil that is diluted in excess of 25 per cent with a foreign liquid loses its qualities as a lubricant and must be changed. Trucks have been known to dilute the crankcase oil in 500 miles of running to such an extent that it was no longer fit to be used. This is about equivalent to a week's work in the field with a tractor.

5. COOLING SYSTEM. At the time of each inspection the radiator should be flushed thoroughly to prevent the

possibility of any sediment from the water blocking the circulating system. All radiator hose and connections in the water system should be examined for leaks, collapsed hoses, etc. If the water pump packing nuts are up to their limit of adjustment then the packing nuts should be repacked with a graphited cord packing. Also repack the grease cups on the water pump and tighten the fan belt if necessary.

6. GOVERNOR. The governor shaft should be oiled in the place provided for this purpose. Under no circumstances is the governor adjustment to be changed, as any increase in speed is liable to prove detrimental to the tractor.

7. CLUTCH. Two types of clutches are in general use, the cone and multiple disc. In inspecting the clutch, the cover to the clutch housing should be removed. Then inspect the clutch release or throw out bearing to be certain that same is lubricated properly. These bearings usually are oiled through an external flexible tube. The cone clutch leather should be kept soft and pliable to prevent the clutch from grabbing. This is done by treating the leather with a small amount of neatsfoot oil. The multiple disk is constructed in two general types, the dry and wet type. The latter type runs in an oil bath and if this type slips, the clutch case must be drained and flushed out with kerosene.

Clutch and Gearset

The bath should be mixed in accordance with the manufacturers' instructions. Most of these use a bath of half kerosene and half lubricating oil. Slipping of the cone clutch can be stopped by placing a small amount of fuller's earth on the face of the leather. Do not permit a cone clutch to slip for any length of time as this will burn the face of the leather and in all probabilities necessitate replacement of the leather.

8. GEARSET. The oil level in the gearset should be maintained on a level with the oil plug level with which most cases are supplied. If there is no level plug, this may be assumed to be on about a level with the main shaft. Inspect the gearset for the general condition of the bearings, gears, end play in the shafts, etc.

9. UNIVERSAL JOINTS. Remove inspection plug and see that joints are supplied with sufficient lubricant. Also test the flange bolts and be certain that they are tight and that the joints do not have an excess of lost motion.

10. REAR AXLE. Remove inspection plug and bring oil to level in the rear axle housing. Test the driving gear adjustment by determining the play between the driving gears by hand.

11. WHEELS. Raise the wheels from the ground and test them for play in the bearings. Caution is to be observed in adjusting roller bearings as they have sufficient play in them to permit of a floating action. If roller bearings are adjusted too tight they will heat and the cups and cones will be cut by the tight action of the rollers. Repack the wheels with lubricant if it is necessary.

12. STEERING GEAR AND CONNECTIONS. Remove any lost motion that may exist in the steering connections. Examine steering knuckle pins and oil and free up all steering parts. Repack the steering gear case if necessary.

The winter overhaul is a fine opportunity to show the tractor operator the advantage of these inspections in that they reduce trouble to a minimum by locating any defect which may develop before it becomes serious enough to cause any real damage. It is somewhat difficult to recommend the time at which inspections should be made, as there are times in the year when the tractor is working almost every day and other times when the machine is idle. During the busy season the tractor should be inspected at least once every two weeks and once a month during the remainder of the time.

Selling Farmer on Tractor Overhaul Matter of Education

By M. F. French

(Service Manager, Rue Motor Co., Chicago Fordson Distributor.)

Selling the farmer on winter overhauling is largely a matter of education. Just as you have started to educate your prospects to secure their tractors when you can get them, whether it be in January or June, you must sell them on the idea of having them always in the best possible condition. Your best advertisement is a list of satisfied users and the surest way to keep them satisfied is to see that their tractors are in proper shape.

This work can be done best when you have the most time to devote to it, and the farmer will be sure to be satisfied if you do a first class job for him. If he realizes that a little more care and attention given his tractor when it is being overhauled will greatly prolong its life, he can be sold on the idea of having the major operations done when your shop is not rushed.

Insures Against Failure

Very often a few days' delay in the spring will cause the failure of a whole crop and there is no greater insurance against breakage than the replacing of worn parts and the adjusting of bearings etc., before the hard work begins. A properly adjusted, freshly painted tractor working on Bill Jones' farm will sell John Smith, his neighbor, with little effort on your part if John Smith is a prospect. Then, too, you will find the farmer more willing to pay for the overhauling if it is done right, and in that way you can make your shop carry its share of the winter overhead expense which usually eats up all the profits for several months.

You might offer some special inducements in the way of decreased charges, etc., during the slack season in order to get all of your customers' tractors in first-class shape by the spring season. Remember your customer's tractor represents just so many dollars worth of power and when it is out of commission he loses just so much each day. It is indeed foolish to claim that your particular make of tractor is built so well that its parts will never break. Rather than that you must show your prospect just how you are fixed for rendering service.

Good Parts Stock Required

You must have good parts stock to show him and if you are handling one of the smaller makes of tractors a service truck capable of hauling the tractor to and from your shop makes a wonderful sales argument and shows the prospect as well as the owner that you are capable of handling the service in a businesslike way. Farmers as a rule are more familiar with machinery and its shortcomings than the average salesman and an endeavor to prove a tractor's proof against breakage is apt to cause the prospect to look askance at your proposition.

Give your repair department half a chance and a little thought and it will make a better showing than you imagine. Just keep plugging away at your owners and you will be surprised at the small amount of effort on your part it will take to sell every owner on winter overhauling.

KEEPING TRUCK REPAIR SHOP BUSY

(Concluded from page 77)

engine, is substituted for the damaged engine, and the truck can continue in service without an abnormal loss of time. By these means the shop is given ample time to place the damaged engine in good condition. Also, the customer is not forced to do without his truck over the period of time it would take to repair the engine under the old system of handling truck repairs.

A scheme similar to this has been worked out for small parts, such as radiators, wheels, batteries, coils, magnetos, etc. If a customer's truck has anything happen to these units, it simply rents a similar unit from the service station while the damaged unit is being repaired. The rental charges for these units are based upon a fair percentage of profit, considering the size of the investment and the depreciation of the unit. It is sometimes very difficult to determine just what these rental charges should be, as in th case of a 4-ton truck wheel which represents a considerable investment, the charges per day must necessarily be high. However, this scheme is largely a matter of service rather than a source of profit.

Time, Place and Man Important in Tractor Business

No. 3—The Man

By Fred M. Loomis
(Motor Age Editorial Staff)

Selling tractors is a business and an art. In this series of articles on tractor selling and service, Motor Age is giving its readers the benefit of the experience of 30 years in the tractor and implement field of Mr. Loomis.

This, the third of the series, deals with the Man to get into the tractor business.

Other articles, which will appear in Motor Age in future numbers, will deal with the Tractor to get in with and other phases of the tractor selling field.

MORE than the mere ability to sell tractors is required for success in the tractor business. Some men can sell almost anything. This faculty, however, does not always carry with it the certainty of being right in what they sell. Unless a tractor is sold right, or the right tractor sold, it is not successfully sold. The sale may be a triumph of salesmanship, but it may also be a reflection upon the good judgment of the seller.

For instance: A certain dealer in North Dakota had the agency for a tractor whose chief merit, from the viewpoint of the farmer, is that by reason of its construction it does not pack the soil. This dealer has sold many of these machines to farmers in his vicinity on this qualification. He sold consistently and right.

But one day a road contractor came along who wanted a tractor with which to roll the roads. He saw one of these machines standing out in front of the dealer's place of business, and its peculiar construction struck him as being just what he was after. So he permitted the dealer to sell him one upon the assumption that it would give him pressure enough to roll roads. The dealer justified the sale upon the ground "that he was not in business to be consistent, but to sell tractors." This sale was a tribute to his ability as a salesman, but it threw discredit upon his standing as an honest business man.

Ignorance Sometimes to Blame

Again: A certain dealer in Wisconsin had the agency for a well-known tractor. At the time he had on hand only one model, a 20-40. Just what he was doing with a machine of that size in his territory nobody knows, but he had it. One day a farmer who owned and worked only 77 acres concluded he wanted a tractor, and was induced by the dealer to buy that 20-40. When the farmer got his purchase home he found he hardly had room enough on his little farm to turn it around in. Final settlement of that sale now is in the courts.

Doubtless this was more a case of ignorance than a deliberate attempt to sell a tractor regardless of consequences. There is evidence to think the dealer himself did not know exactly what he was doing. Both he and the farmer were deluded. Nevertheless, the dealer had the ability to sell this particular tractor, but here salesmanship was a detriment to his business rather than a benefit. Both dealer and farmer would have been better off had the former not been so good a salesman.

Such instances might be multiplied indefinitely, because the tractor business has been full of them. They merely go to prove that the man who sells tractors is a mighty important factor in the business. He must have certain qualifications and characteristics entirely apart from his ability as a salesman if he would be permanently successful in the tractor business.

Dealer Must Know the Tractor

In running over the qualifications for a road tractor dealer, it is somewhat difficult to hit upon that characteristic which shall be considered the most important. Maybe it is the man's attitude toward the tractor business as a whole, what the tractor means to him in its relation to agriculture, or, in other words, what his vision of power farming is.

It takes imagination to sell tractors successfully. By this it is not meant that the dealer should be visionary or theoretical about the tractor. On the contrary, he should be painstakingly practical about it. But he should have imagination enough to see the future possibilities on the farm where the tractor has been substituted for the horse as the power unit. He also should have vision enough to look ahead and depict in convincing terms the realization of these possibilities. His vision should be comprehensive enough to see the consequences, not only for the individual and average farmer, but for his community as a whole when it shall have been converted to a tractor power basis.

To get down to brass tacks, the dealer should understand and feel that whenever he sells a tractor he is improving the condition of the farmer to whom he sells, and that he is putting something into his hands which will enable him better to realize on his efforts, to become a better farmer and a more successful business man and to assist him in making money. He must feel that he is selling the farmer something better than he has ever had before, something which will make him more efficient, something which will enable him to lay up more dollars in the bank. And with this conviction of the merit of the tractor as a farm money maker must go a knowledge of and the ability to prescribe the necessary equipment to make that tractor in each individual case the best and most economical possible adjunct to the farmer's equipment.

In other words, the dealer who properly visions the tractor business will not sell tractors just because it happens to be the fashion to sell them, but because he is possessed of the conviction that in selling tractors he is doing good to his community by making the operation of the farms in that community more certain and profitable and thus doing his share toward making that community a better one to live in.

This is by no means a fanciful conception of the meaning of the tractor business, nor is it attributing to the dealer a fantastic attitude toward the business. It merely is putting into idealistic language the plain, common-sense business attitude of the average business man. The ordinary merchant, whatever he sells, while he may assert he is in business primarily for the sake of making money for himself, at the same time will admit, if he takes time to inspect his motives at all, that while he wants to make money for himself he also wants to pass on to his customers full value for their money in every deal, and he honestly and conscientiously wishes every sale he makes to benefit and satisfy the man who buys.

Must Sell Himself First of All

This, then, is all the tractor dealer wants. But unless he feels and knows this himself it is doubtful if he belongs in the tractor business. This means, in short, that the dealer first should sell himself thoroughly on the tractor. He must believe profoundly that it is the right and proper and money saving thing to do to substitute mechanical for animal power on the farm, and he must know why he believes this.

The dealer who has sold himself on this idea, provided he has also convinced himself that the time to sell tractors is at hand and that the place is the right one, will go at the business of selling

tractors determined to put the right machine in the right place and to make every sale conform to the conditions surrounding that sale. He has taken out the most reliable insurance policy against making serious mistakes.

The dealer who has thoroughly sold himself on power farming must necessarily have made something of an investigation of his trade possibilities. He hardly could have convinced himself otherwise. In a matter involving as large an investment of money and time as selling tractors takes, none but a foolhardy dealer will take a chance unless he has a definite idea of what he is undertaking and why he is undertaking it. And he cannot know much about the possibilities unless he has taken the time and pains to make preliminary investigation. The man who jumps in without proper consideration and who does not know what he is doing, cannot last long. Such men are the chaps who get cold feet in the tractor business and who soon get out of the way for better men. There have been a great many such in the business in the last two or three years, but they are disappearing rapidly.

Makers Are Sometimes at Fault

Then the man who undertakes to sell tractors must realize he is going into something which demands a considerable degree of specialized knowledge, much more in fact than was demanded of the old-time horse drawn implement man. Success in selling tractors depends almost entirely upon not making serious mistakes, and the only way to avoid making such mistakes is to know what one is doing. In making a sale, every sale, the dealer must know with a fair degree of accuracy that he is selling the right kind and size of tractor and that it is adapted for the work it will be called upon to perform.

It does not follow that just because a tractor is a good thing in general that the same tractor will do the business in every case. Many dealers have made some serious mistakes in acting upon such an assumption. Perhaps it is not fair to blame the dealer altogether for this. Some responsibility must attach to the manufacturer.

The latter, many times makes one type or size of tractor. Naturally, he wants to sell as many as he can. Having designed his machine to meet as many average and general conditions as he can, he naturally represents his machine to be adaptable to any and all conditions. Also he conceives it to be to his advantage to have as many dealers as possible handling his product exclusively. Under these circumstances it is natural to expect him to allow his desires and his enthusiasm to run to extremes, with the result that many times the dealer is induced to sell a particular make or size of machine in circumstances where some other type or size would have been better. It should be the desire of the conscientious dealer always to sell the machine which will come the nearest to being 100 per cent efficient for the particular field in which it is sold, and this he cannot do when he does not understand thoroughly what he is doing or when he is compelled to depend upon a single make or type or size of tractor to meet all conditions.

Probably the dealer does not get a clear understanding of the importance of this fact when first he goes into the business. He learns it in time, however. There are dealers who have learned it so well that they actually refuse to sell tractors where there are conditions which will be unusually difficult for their type of machine to meet, or where the man who wants to buy is for any reason not a desirable customer. These dealers have the sort of trade conscience which warns them not to go wrong.

With a standard tractor to sell, and one which meets average conditions fairly well, it must be admitted, of course, that the dealer can many times suggest changes in the layout of fields, or in crop rotation, or in other things of like nature, which will have the result of adapting the conditions to the tractor instead of taking a chance on the tractor adapting itself to the conditions. This depends upon the astuteness and knowledge of farm conditions of the dealer. If he is able to do this he soon will increase his possibilities on any type or size tractor he happens to sell. Instances are numerous of dealers who have done this and who have got across successfully with tractors which at first seemed hopelessly unfit for the conditions.

Must Have a Specialized Knowledge

This merely emphasizes the statement made above that the dealer must have a specialized knowledge. He must know accurately and familiarly the conditions under which every tractor he sells will be called upon to work. The tractor dealer should know as much or more about agricultural conditions and possibilities in his neighborhood as his customers. He must know, at least in a general way, what the configuration of the land is on virtually every farm where he hopes to sell a tractor. He must know something about the average character of the soil which the tractor will have to encounter in doing its work. He must know what crops are raised and what are the best cultural methods for each. He must know approximately how many days' work the farmer will have for his tractor on the drawbar and how many on the belt. He must know what equipment the farmer already has and what he will need to make effective use of his tractor if he should buy one. He must know enough about all of these things so he can give expert and dependable advice if he is asked to give it, or be able to apply this knowledge when he tries to sell a tractor. In other words, study must be given to each individual case in order that the best results may follow.

At the outset this looks like a considerable problem for the dealer to undertake. He is likely to think that if he must qualify as an agricultural expert in his community, besides being a salesman, maybe it will be just as well for him to let the tractor business alone. Yet the dealer who is not willing to do this has only a limited chance of making a permanent success selling tractors. The dealer who cannot convince himself of this fact and who is not willing to undertake the work and trouble of acquiring this knowledge would better admit that he is not the ideal man for a tractor dealer.

However, it is neither so difficult nor so complicated as it may seem. Commencing with a general knowledge of the conditions to be met, which the dealer must have gained while he was making his preliminary investigation to determine whether he should go into the tractor business, a more detailed and specialized fund of information will begin to pile up with each successive sale. The dealer will be surprised how quickly and easily he will acquire that intimate acquaintance with his surroundings which is so necessary to a successful conduct of the tractor business. All he needs to do is to realize that such knowledge is essential and the information will begin to accumulate without conscious effort on his part. At least, such has been the experience of the dealers who have been most successful.

Selling Tractors Is Real Work

Another thing the dealer must realize is that selling tractors is hard work. Under no conditions is it an easy job. Creased pants and kid gloves do not go with tractor selling. Some dealers have not realized this until too late. It takes hard, persistent and conscientious work to sell tractors, but the final reward justifies it all. Because some dealers have not worked at the job as they should have they have been disappointed with results, and this has had much to do with the idea entertained by some that there is no money in selling tractors Upon the contrary, there is lots of money, but the dealer must work for it to get it.

This does not imply that the man who goes into the tractor business must be a paragon of dealer virtue and know everything himself. But it is certain that either he must have all of these qualifications himself or he must have the ability to hire men who do have them.

Some of the dealers who have been conspicuously successful in the tractor business in the last two or three years are men who, if left entirely to their own devices, would scarcely have succeeded. They are men who are better executives than salesmen. Their success lies in their ability to hire the right kind of men and then to direct them efficiently.

It really matters little whether it is the dealer himself or his employee who possesses the necessary qualifications. The important fact is that the man who actually solicits business and installs the tractors, whoever he may be, should be such a man as has been indicated. And the all important fact for the dealer himself to recognize is that if he himself does not care to undertake the acquisition of the sort of specialized knowledge necessary, or if he does not care to undertake

(Continued on page 90)

Garage Planning
Service Station Arrangements

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquirers are urged in asking for such plans to be sure to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

No. 123

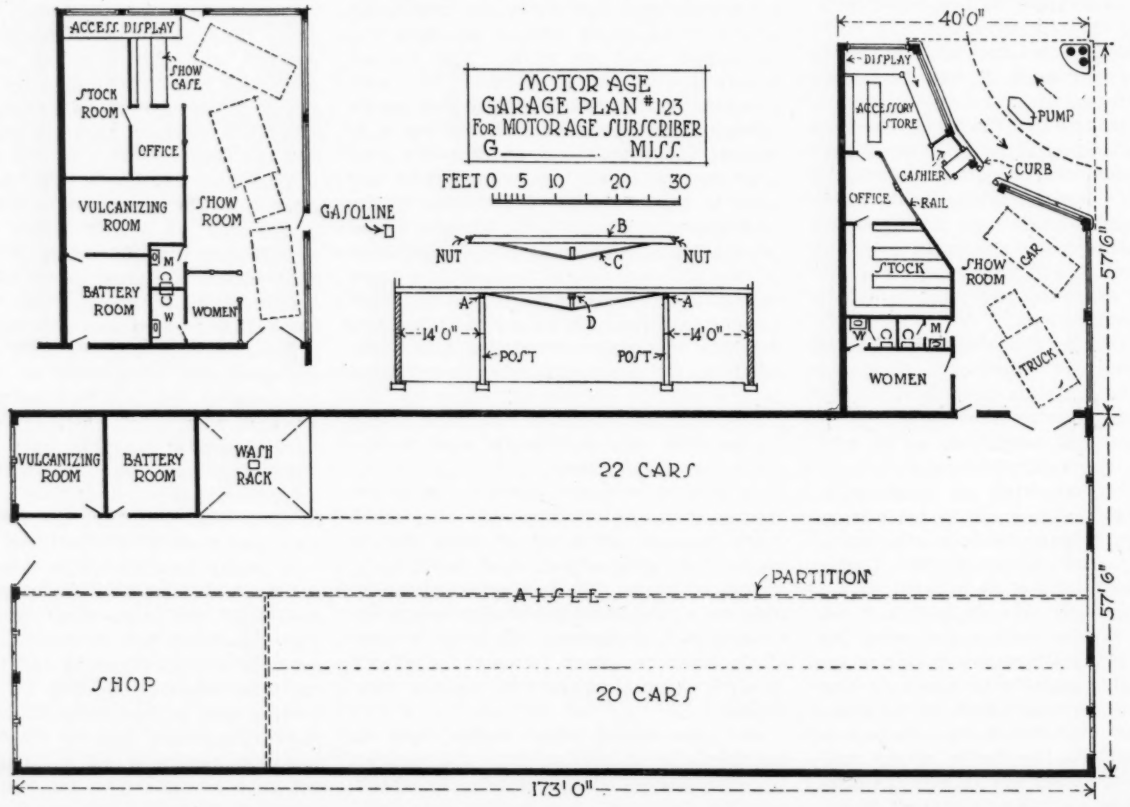
DRIVE-IN FILLING STATION

PLEASE give me your idea as to a layout for the following business: gas and oil, tires and accessories, batteries, wash and storage. I have leased a place having a 40 ft. frontage on Fourth street and extending back 57 ft. 6 in., then an L which is also 57 ft. 6 in. extending 173 ft. back from K avenue to an alley. I want a drive-in filling station on corner of Fourth and K avenue with a center drive back to storage place as indicated by enclosure. Possibly I will handle a sales agency for automobiles, but will not do a general repair business, furnishing service only for cars I sell. This is a brick building, formerly used for livery stable. I shall convert for above business and want to do it with $3,500 or less.—T. O. Thomas, Grenada, Miss.

Your layout is not practical. In the first place, your corner filling station has not nearly enough room for two cars to enter. Your layout is represented by the dotted line on our plan. The idea of trying to combine a drive-in filling station with a garage does not appeal to us, unless it is handled in the liberal way that an oil company would handle it. If your gasoline business warrants only a one-pump station, why not place the pump on the curb in the regular way instead of ruining the best part of your garage, the most valuable show space, with a "two by four" drive-in filling station which no one could possibly mistake for an oil company's place?

The second impractical part of your plan is to try to run a driveway through the center of this 40 ft. addition with show rooms, offices, etc., on each side. There is no real reason for this driveway, there being an ample entrance to the garage, and we are sure it would spoil the office and make a show room impossible.

We show two layouts for your office, one with the drive-in filling station, as requested, and the other our own suggestion with the filling station on the curb. In the former, we have been obliged to move the tire and battery rooms to the rear of the garage, but in the latter the space gained from the filling station corner allows a larger car display room and also room for the tire and battery rooms besides. While we do not approve of these departments being grouped with the office on account of their foreignness to office and sales ideas and their general mussiness of appearance, you may have some reason for wanting them so placed.



Plan for a corner drive-in filling station. The drive-in station is discouraged for the garage of average size, as it takes up an undue amount of valuable space

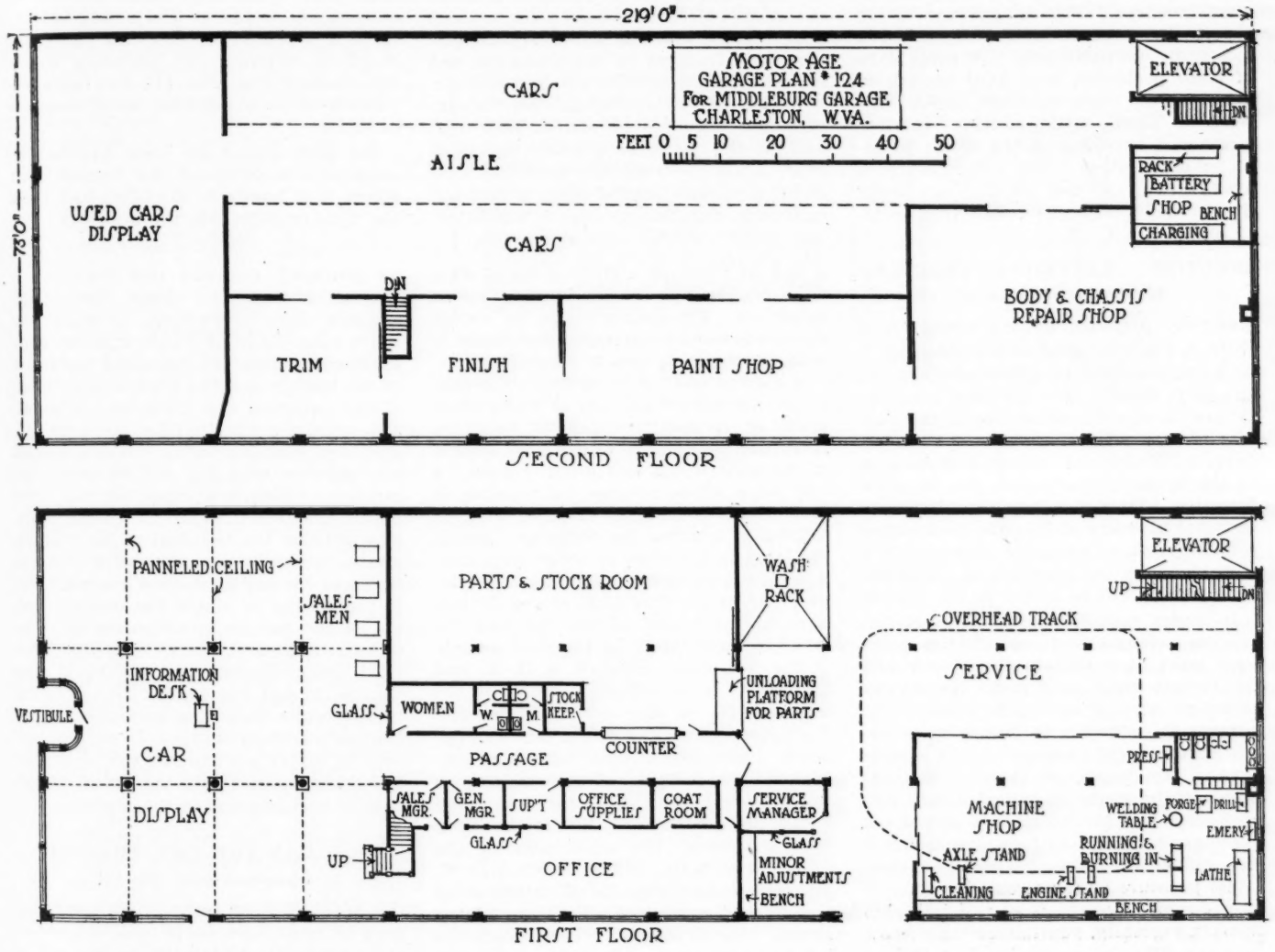
Your layout shows a partition running through the center of the old building. This will have to be removed before you can have a first-class place. This may be done in numerous ways, one of which we show. It consists of installing posts 14 ft. apart or 20 ft. 6 in. apart, leaving room between for two or three cars respectively, and about 14 ft. from the walls. Resting on these posts are beams *A-A* carrying the center of the rafters. Above each pair of posts is a beam inserted between the rafters with a truss rod *C*, as shown, which will support a center beam *D* carrynig the ends of the rafters. After these trusses are installed the nuts on the end of the rods are drawn up until everything is snug. Two entrances to the garage will gain nothing as there is only space for one aisle even though a wide one.

No. 124

NO BASEMENT FOR GARAGE

I HAVE just purchased a corner lot 73 ft. by 219 ft. in the hear of the business district of Charleston, on which I expect to erect a salesroom and service station.

It is my intention to have a basement covering the entire lot, salesroom and service station on first floor and storage for new cars only on the second. If you have any suggestions to offer, the



Three-floor plan for garage. The use of the basement for anything but the storage of cars is discouraged, as the air is bad for cars and dangerous for workers

same would be appreciated. It would be my intention to make the 73 ft. the front of the building, and the 219 ft. the depth, with either a driveway or elevator from basement to second floor.—Midelburg Garage, Charleston, W. Va.

You state you want a basement under the entire building and that your second floor will be reserved for new car storage. What do you intend doing with this extensive basement? It is large enough to store fifty-eight cars, and is not of much value for anything else in your business. You cannot use it for repair shops where men have to work mostly by artificial light. In these days of labor problems, it is hard enough to get men to work in good, light, airy rooms. Then, again, during summer weather a basement is the worst possible storage place. The temperature is always from 10 deg. to 20 deg. lower than outside, with the result that moisture-laden air, especially in humid weather, finds its way in and deposits its moisture on everything. The iron work gets rusty and cushions and tops get musty and mildewed. Under these conditions, we believe an underground basement has no place in the well-planned garage.

While we have designed a sales and service station with basement as you requested, we urge you literally to move the basement to the second floor and use the second floor as planned for a third floor. Thus you will avoid all the disagreeable features of the basement and gain all the advantages of light and air.

We advise storing the cars on the second floor because the second floor will contain the posts supporting the third floor, while the roof will need no posts and the present second floor is laid out in such a way that the posts will interfere with its arrangement. Another good reason is that the light on the second floor will not be as good as on the third floor.

The elevator seems better than a ramp for your purpose, as you will not have any great volume of cars to mave, as would be the case if you were planning a regular public storage garage where practically all cars go out and come in every day. Again, a ramp would cut into your space and make everything subservient to itself. You would have to fit your business around the ramp, instead of building for efficiency alone. See Garage Plan No. 119 for ramp arrangement in a building about the size of yours.

We have placed the used car display room at the front of the second floor where it is handy to the office and main car display room, via the stairway.

SHOOTING ELECTRICAL TROUBLES

(*Continued from page 63*)

electrical pressure in this circuit is 6 volts, a current equal to 6 divided by 2, or 3 amperes, will be produced when the circuit is closed. The effective pressure as used means the difference in the sum of the pressure acting in one direction around the electrical circuit and the sum of the pressures acting in the opposite direction. Thus if a generator having a terminal pressure of 7.5 volts is charging a battery whose terminal pressure is 7 volts, an effective pressure of 7.5 minus 7 or .5 volts will be acting in the circuit.

In order that there be an electrical current in any circuit an effective pressure must be acting in the circuit and the circuit must be closed. So in any electrical circuit in which there is no current the difficulty is due to there being no electrical pressure in the circuit or the circuit is not closed. For example, if the ammeter indicates zero current when the headlights are turned on, see Figs. 2 and 3, you immediately know the difficulty. Either there is no electrical pressure or the circuit is open. If at the same time the cowl and taillights operate normally, you immediately know that the difficulty is not due to a lack of electrical pressure but to an open circuit. An inspection of the diagrams in Figs. 2 and 3 will show that all the various light circuits have certain wires and connections in common. That is, starting with the frame of the car, you can pass along wire 9, through the battery along wire 8 to the junction point 7, along wire 6 and through the ammeter along wire 4 to terminal 26 on the cowl switch, where the circuit branches to the horn, the cowl light and the tail and headlights through the cowl switch. If the cowl and taillights operate, all connections and wires along the circuit just traced are O. K. up to the terminal 26 on the cowl switch. If neither the low-nor high-candlepower bulbs will burn, the difficulty is more than likely in the switch, although both fuses 21 and 16 may be burnt out. The fuses may be tested by connecting the terminals with a pair of pliers or a short piece of wire, thus closing the circuit if the fuse is burnt out. The connection in the switch may be tested by connecting terminals 26 with terminals 23 and 19 respectively.

If neither of these tests locate the difficulty, the circuit is open at some other point or it may be open at both the fuses and switch, in which case neither of the tests would locate the trouble. A test lamp whose voltage corresponds to that of the headlights may be used as follows in locating the difficulty. Mount the lamp in a socket provided with flexible terminals several feet long and connect one of the free ends of the flexible wire to the frame of the car and the other to terminal 26 on the cowl switch. If the test lamp lights it is O. K. and the circuit is, of course, O. K. up to the terminal 26, as the cowl light burned. Turn the cowl switch so the high-candlepower light should burn and then connect the free terminal of the test lamp to the terminal 19, and if the test lamp burns the switch is O. K. If the lamp does not burn, the connection in the switch is at fault. If the switch is O. K. proceed to the right-hand terminal of fuse 21 and again test. If the test lamp burns, wire 22 is O. K. Then touch the left-hand terminal of fuse 21, and if the lamp burns the fuse is O. K. Next go to junction point 19, if it is possible to make electrical connections there; if not, open up headlights and test circuits by applying end of test circuit to terminals in lamp sockets. Proceed along the circuit in this manner until you reach a point on the circuit where the test lamp does not light. The circuit is open between this point and the last point where it did light. This same line of reasoning will apply to every electrical circuit on the car, and difficulties caused by open circuits easily may be located by following carefully the wiring diagram.

The importance of the wiring diagram in locating cases of trouble thus is readily seen, and you cannot become too familiar with these diagrams for the different systems.

If the system happens to be grounded at some point that is not supposed to be grounded you can test for such a ground as follows: First remove all grounds from the system as shown in the wiring diagram. This may be done by disconnecting the grounded terminals of the battery and the grounded terminal of the generator and removing all lamps. The ground connection for the horn circuit and starting motor circuit should not interfere with any test on these two circuits, which are open at the horn button and starting switch respectively. Now connect the terminal of the battery, which normally is grounded to the frame of the car by the test lamp circuit. If the wiring to which the other terminal of the battery is connected happens to be grounded, the lamp will light, provided the resistance of the ground connection is not too high. The different light circuits then may be tested by disconnecting them in turn from the battery by taking out the fuses or loosening the wires from under the screw terminals if no fuses are in the circuit.

THE MAN FOR THE TRACTOR

(*Continued from page 87*)

the hard work of selling and installing, then he must have some man in his employ who will undertake to do all of these things. Otherwise, that dealer would better stay out of the tractor business.

Finally, the dealer must realize the paramount importance of the service which will be necessary on the tractors he sells and the absolute necessity for his preparing himself for that service in the way of competent men and adequate equipment.

In the present stage of the tractor business service is up to the dealer. It no longer is possible to pass the service buck to the factory.

This fact the manufacturers have come to realize and they are taking the occasion to make it worth the while of the dealer to equip himself properly to handle the service himself. Henceforth the dealer who can and will do this will receive special consideration in the way of increased compensation.

The Readers' Clearing House

Questions and Answers

Engines

BUILDING A FORD RACER

Q—In building a Ford racing car how can the transmission and flywheel installed be balanced when about 1 or 2 in. has been turned off of the flywheel?

2—Illustrate and describe how to line up pistons and connecting rods.

3—How much clearance from the top of piston to cylinder head should there

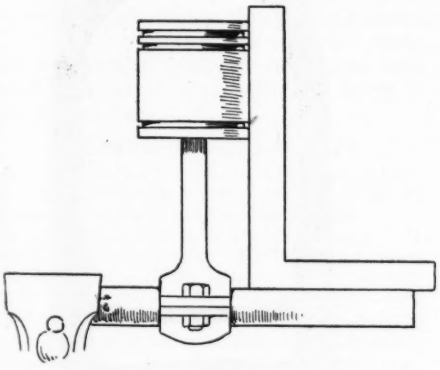


Fig. 1—Showing method of aligning up pistons with a carpenter's square

be without pounding and using eight 1¾-in. overhead valves.

4—Explain in detail the correct setting of a high speed cam for fast work. I am trying to get as much compression as I possibly can.

5—Will light pistons and rods need counterbalances on the crankshaft? Would it help balance the engine, as the flywheel has been lightened?—C. D. Jones, Belcher & Co., Cleburne, Tex.

1—We do not see that it is necessary to do any balancing of either the flywheel or transmission, if the work of turning down the wheel has been carefully done. The illustration in Fig. 4 shows how the transmission may be mounted on knife edges. With this means it will be possible to determine any out of balance that there may exist.

2—Several methods for lining up rods and pistons are shown in Fig 1. The simplest scheme is with the use of a square. A rod gage when made as the illustration suggests is a valuable tool for the repair shop. With it a rod can be lined up instantly and any rod not in alignment can be noticed by the contact of the surface plates.

3—There is an easier method of determining piston clearance. Sixty lb. is the compression pressure of the Ford engine, and if this is to be increased the bottom of the cylinder head should be planed off. One-eighth of an inch is ordinarily enough material to plane off to effect a material increase in the performance of the engine.

4—We do not quite understand just how much you want in connection with

Conducted by Roy E. Berg

Motor Age Editorial Staff

THIS department is conducted to assist dealers, service stations, garagemen and their mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Motor Age reserves the right to answer the query by personal letter or through these columns.

this high speed cam. It you want a cam which will give a fast timing for high engine speed, you cannot accept any cam shaft already built, but must lay one out

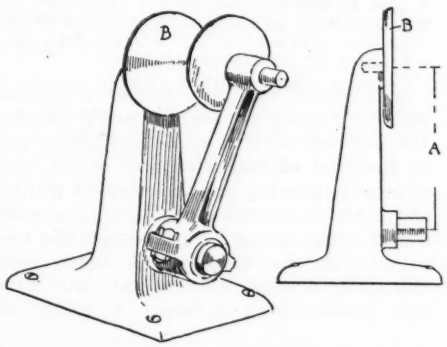


Fig. 2—Aligning jig to test the straightness accuracy of the connecting rods

for yourself. You will undoubtedly want a convex flanked cam, this being the type that is used in several notably fast racing cars. Decide first upon the lift of the cam and on the valve timing. We recommend that you use the following valve timing because it is fast and has been used on some extremely fast engines. Ex-

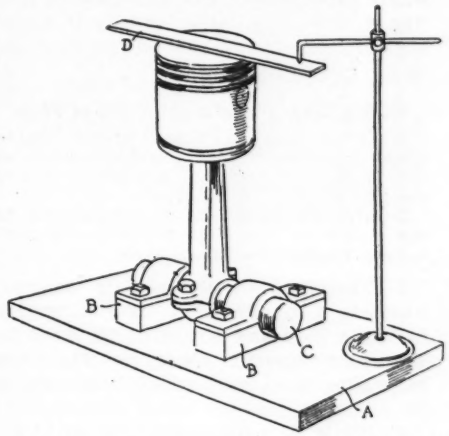


Fig. 3—Another method for aligning the piston using a surface gauge

haust valve opens 55 deg. before bottom dead center and closes 10 deg. after top dead center. The intake valve opens 10 deg. after top dead center and closes 55 deg. after bottom dead center. See Fig. 5.

Using these values, strike the circles *a* and *c*. The difference between the radii of these circles will represent the height of the valve lift. The lines *ee* should then be drawn, the angle between them being obtained from the timing of the valves given above. It should be remembered that for every degree traveled by the crankshaft there is ½ of 1 deg. traveled by the camshaft. Next draw the small circle *g* touching at its highest point the circle *c*, which represents the highest valve lift. The radius of the

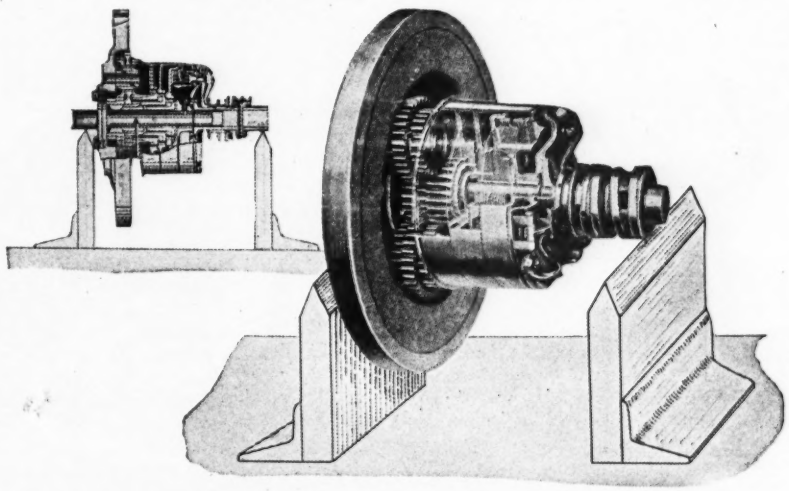


Fig. 4—Balancing the transmission and fly-wheel of a Ford. A flange must be made with a short end extending to take the place of the nut of the crankshaft

small circle is dependent on what you want from the engine. The larger this circle the longer this valve will be open. In the illustration, Fig. 5, the scale is about twice as large as it should be, so you can gage from this in making your drawing. Then draw the flank of the cam, with radius *R*, tangent to the circle *a* at *A* and the small circle *g* at *B*, from the center *O* determined by trial.

5—Counterbalances will help the crankshaft considerably, providing they are carefully fitted. We know of several successful jobs of engine rebuilding where the flywheel was lightened by cutting it down, but, after cutting it down, a band was shrunk around the flywheel to increase its weight.

BORE AND STROKE OF TRACTOR

Q—What is the bore and stroke, engine speed draw bar pull, rated horsepower of this G. M. C. Sieve Grip Tractor? This is the Old G. M. C. Sieve Grip.

2—Give working cuts or aerial view of the 5 and 10 ton Holt military tractors. —Roy Watts, Sheridan, Wyo.

1—The Samson Sieve Grip tractor, which is the model 30-X, uses an engine having a bore and stroke of 4¾ by 6 in. The engine speed is 120 r.p.m. The draw bar rating is 15 hp. and the rated hp. is 30.

2—While it is impossible for us at all times to give illustrations of just the type requested, we are showing in Fig. 6 and Fig. 8 two illustrations of the Holt 10-ton tractor.

TROUBLE IN STARTING ENGINE

Q—We have an Enger 12 which cannot be started by the battery. Have just had the battery recharged, but it turns the engine so slowly that starting is impossible. Even when we spin the engine by hand it will not start. But if we tow it for fifty feet it will start and run perfectly. After the engine is warm the starter will start the engine at any time. We are unable to find anything wrong with the ignition or carbureter. The carbureter is a Stromberg. This car has only been run 3600 miles and we are at a loss to know what to do. The car has two breakers in the distributer and Westinghouse starter.—C. G. Walsh, Reo Motor Sales Co., Decatur, Ill.

The cause may be one or a combination of many causes. It might be that the battery, even though charged, is not in the best of condition and is not capable of supplying enough current during the starting period, even though a voltmeter shows about 7 volts across the terminals of the battery. A long, slow charge at a small current rate will cure this trouble if it is here. It might be that the engine has been recently overhauled and is so stiff that the battery is unable to turn the engine over. Perhaps the loss of compression is so great that starting would be difficult even with everything else right. How is the starting motor? Generally one should expect little trouble from a starting motor because of its infrequent use, still there are things that might cause one of these to be at fault. See if any of the brushes are loose, or if any of the contacts are loose and causing a waste of current.

TO assist readers in obtaining as a unit all information on a certain subject, MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

ENGINES

C. D. Jones, Belcher & Co.....Cleburne, Tex.
Roy Watts.....Sheridan, Wyo.
C. G. Walsh, Reo Motor Sales Co.....Decatur, Ill.
W. R. Hamilton.....Mason City, Iowa
R. R. Freeman.....Phoenix, Ariz.
Harry Moddock .....Guelph, N. D.
Edgar Durnan.....San Francisco, Cal.
Warren E. Leavitt.....Baltimore, Md.
Dom Segna.....Detroit, Mich.
I. H. Cwift—Aurora Motor Car Co.....Aurora, Ind.
F. H. Shaffer .....Kendallville, Ind.
T. J. Babb .....Inez, Tex.
E. J. Urban .....Chicago

MISCELLANEOUS

Ira P. Hayes .....Eckford, Mich.
M. H. Elder .....Atlanta, Ga.
Andrew L. Knobel .....Elm Creek, Neb.
Emerson L. Soland .....Niota, Ill.

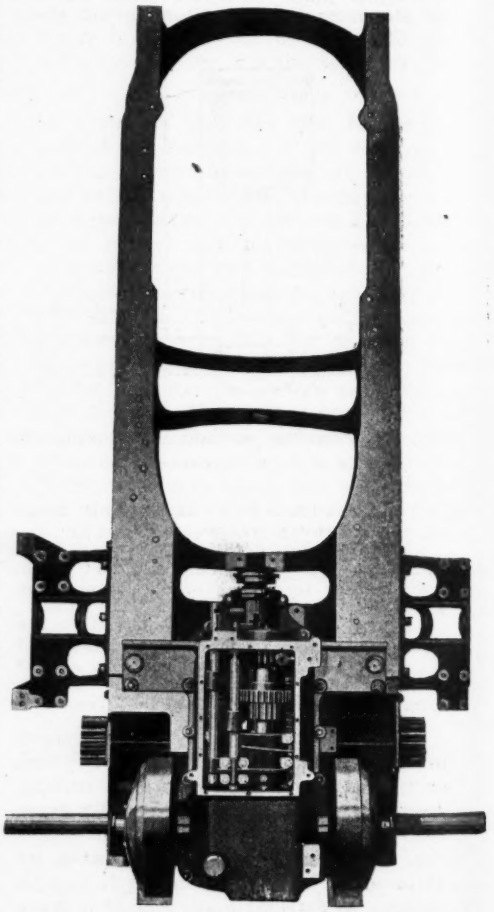


Fig. 6—Airplane view of chassis on Holt caterpillar tractor

TROUBLE WITH LOOSE FLYWHEEL

Q—There is a knock in a Linnwood light six Paige touring car equipped with a Rutenberg engine which seems to be getting worse. It might be described as a hollow, throaty sound occurring with each revolution of the crankshaft and instead of being a single knock there are really two knocks very close together and then quite a long interval before they occur again. The first knock is much less pronounced than the second one. —W. R. Hamilton, Mason City, Iowa.

This is an unusual knock and we believe that the flywheel is slightly loose on the flange where it is bolted to the crankshaft. There have been many cases reported where a loose flywheel has caused trouble which you have so aptly described. Furthermore, a noise produced by the flywheel being loose will sound exactly as if it were coming from the rear part of the engine. The crankshaft acts as an ideal sound transmitter

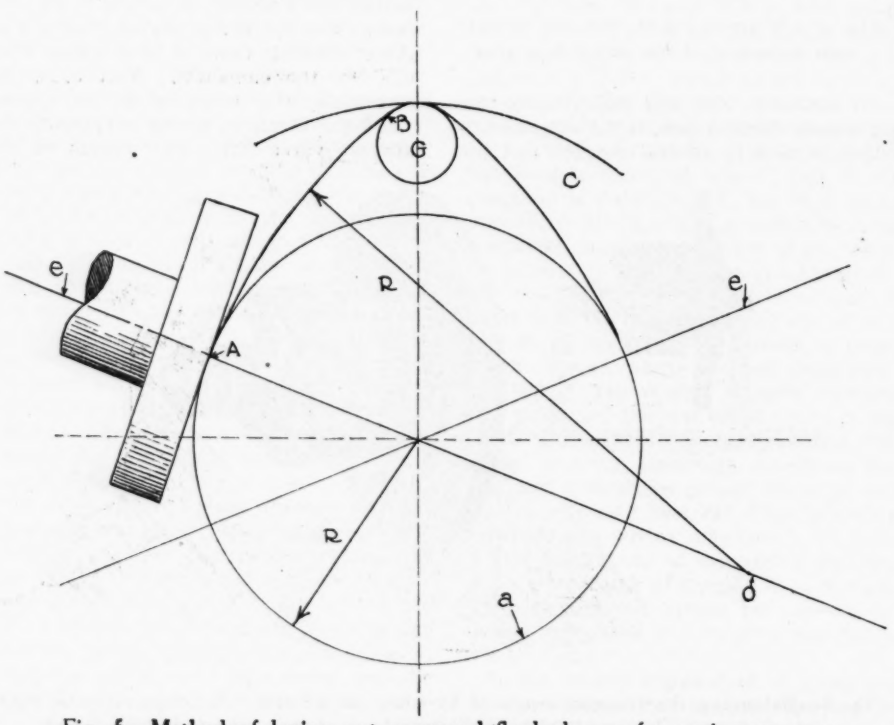


Fig. 5—Method of laying out convexed flanked cam for racing car use

to the crankcase, where the noise is picked up and reproduced exactly as is the case in the phonograph reproducer or soundbox.

CORRECTION ON POWER CURVE

The two power curves in the Oct. 9 issue, page 34, Fig. 11 and Fig. 12, should have been shown as Fig. 12 and Fig. 11.

END PLAY IN TIMING SHAFT

Q—Would there be a noticeable knock in a Ford engine if there was about 1/32 in. end play in the timing shaft? If not, how much would cause a knock?—R. R. Freeman, Phoenix, Ariz.

It is possible that a play of this amount would cause a knock and then again under slightly different conditions, using heavier oil for example, the knock might be eliminated. Many times in tests where it is desired to show up the little tapping sounds noticeably, a very light oil will be used for a few minutes' time. However, under ordinary conditions this small amount of play will not cause a perceptible tap.

WELDING A CRANKSHAFT

Q—Could the break in the crankshaft of a Big Four be welded so it will be as strong as a new one? Size 2¼ in.

2—Where could this work be done? It would not make any difference if that bearing was a little larger as the boxing could be rebabbited.—Harry Moddock, Guelph, N. D.

1—Yes; any shop doing welding work should be able to repair this shaft, making it as strong as it was before it was broken.

2—Glancing through the advertising columns of MOTOR AGE, we notice listed there the names of several people doing welding. One in Omaha, Neb., reasonably close to you, can undoubtedly handle the work.

SILENCE IN ENGINES

Q—What is the most silent four-cylinder motor car known?

2—Publish a phantom photo of a 1920 four-cylinder Willys-Knight.

3—How many grease cups has the 1920 Willys-Knight?

4—What is the capacity of oil in the engine, transmission and differential when at the correct level in a 1920 Willys-Knight 4?

5—What mileage can be obtained from a gallon of gasoline with a 1920 Willys-Knight 4?—Edgar Durnan, San Francisco, Cal.

1—This is a question that we cannot answer because of many reasons. Judging between the two types of engine mostly in use, namely the Knight engine and the poppet valve, there are some differences which seem to give the Knight engine the preference. It must be remembered that in a poppet valve engine there is always a small space between the valve tappet and the valve stem, and during every other revolution the valve stem is struck a hammer blow by the valve tappet. In the Knight engine all motions of the sleeves are actuated from eccentrics, and in a properly made eccentric there is no lost motion or play to be taken up during the revolution.

2—See Figs. 7 and 12.

3—For this we advise you to see Fig. 8, in which is shown the methods and amounts and number of times that each part should be lubricated.

4—For this size engine it is customary to estimate that a gallon or five quarts of oil will fill the bottom pan. We do not know the exact quantity of oil to place in the differential and transmission, but these members should be filled about half full. If the gears in the transmission are covered more than half there is a loss in whirling the oil around which is not made up by any extra lubrication from the added oil.

5—Much of the gasoline mileage from a car is dependent upon the ability of the driver. In the hands of the average owner the Willys-Knight 4 should give about 15 to 16 m.p.g.

BORE AND STROKE OF OVERLAND

Q—What is the bore and stroke of the large and small four and also the six-cylinder 1916 Overland?

2—What horsepower do they develop?

3—What are the sizes of valves and pushrods?—Dom. Segna, Detroit.

1—The bore and stroke of the large 1916 Overland four is 4.125 by 4.500, of the small Overland four, 3.125 by 5.00 and the Overland six, 3.500 by 5.250.

2—The N. A. C. C. horsepower rating of the small Overland four is 15.63, of the large 27.23, and of the Overland six is 29.40.

3—For this data we refer you to valve timing data appearing in MOTOR AGE, August 28.

FORD ENGINE IN MOTOR BOAT

Q—Publish full dimensions for fitting Ford engine to motor boat.—F. H. Shaffer, Kendallville, Ind.

Fig. 10 shows a sectional view of a suggested boat design using a Ford engine in the power plant. We believe you will get the best results by making the boat from 20 to 22 ft. long, 5 ft. beam and 1 ft. draft, the latter being for the hull only. The water the boat draws is determined

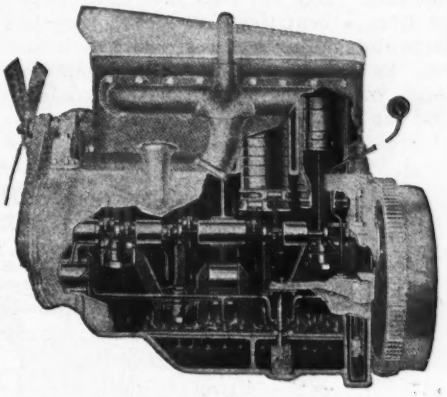


Fig. 7—Cut-away view of Knight engine used on Moline car

by the size of the propeller. If there are obstructions in the water where you will use the boat, better fit some form of skeg or protection below the propeller.

In mounting the engine fit strong oak cross-members in the engine compartment and fasten it in place with lag screws, using the same brackets fastened to the engine. Leave the transmission attached and mount the power plant so it will be level when the boat is in the water and under way. Boats rise out of



Fig. 8—Semi-aerial view of Holt caterpillar tractor with special war fittings

the water when traveling fast, so you must make allowance for this. The engine will oil better when on a level. Proper adjustment can be made with shims under it.

Fig. 10, page 95, shows a cranking device so the engine can be started from the dash. You will also have to arrange to drive a centrifugal or gear pump to force the cooling water around the jackets. Be careful not to get this pump too large, or the engine will be overcooled. You can arrange to run some of the overflow water into the exhaust pipe, a foot or more from the engine, which will help to muffle the noise. It is hard to give specific propeller dimensions, but if you build from the design shown, we should think one having a diameter of 15 in., three blades, and a pitch of 22 in. would be about right.

CLEARANCE FOR ALUMINUM PISTONS

Q—Give remedy to prevent pistons from pumping oil in Oakland six engines. Would you suggest replacing the aluminum pistons with cast iron, or will new rings with one Super-Oyl ring at the top eliminate this trouble?

2—What is the proper clearance for aluminum pistons?—I. H. Cwift Aurora Motor Car Co., Aurora, Ind.

1—In Fig. 13 we show a method to help out the oil pumping difficulty. Place the pistons in a lathe and turn out four grooves, equally spaced, of the dimensions shown in large sections. The bevel edge of the groove should be toward the top, and in line with the upper bevel edge of the groove a number of small holes should be drilled equally spaced around the circumference of the pistons. Fifteen or twenty holes should be drilled in each groove. Make the holes very small in diameter with a No. 44 or No. 48 drill, whose diameters are respectively .0860 and .0760 in.

2—Recently we had a letter from a manufacturer of aluminum pistons in which was told the development of the aluminum piston. It was explained that when the aluminum piston was first introduced, several years ago, it was thought necessary to make the piston clearance about twice that which was necessary for iron pistons. This was occasioned by the fact that the coefficient of expansion for aluminum is about two times that of iron. Now, however, this manufacturer has found by much experiment that aluminum pistons can be fitted with a clearance of .0035 in. It was also found that pistons fitted to this clearance eliminated much of the oil pumping difficulty.

THE IDEAL VALVE SEAT

Q—A states that the narrower the polished surface on the face of a valve seat the better. B states that the ideal valve face is one which is polished the full width of the surface bearing on the valve seat. Which is right and why?—Warren E. Leavitt, Baltimore, Md.

A is correct, but it depends upon the size of the valves. The smaller face is easier to grind and a better seat can be obtained, there is less liability to pitting and very much less chance for minute pieces of carbon to collect and remain on the valve seat. The chief reason that a smaller valve is better is that the intensity of the pressure of the valve on the seat is greater with a smaller seat. This allows the valve to make a tighter fit into the seat with the consequent reduction of leakage possibility.

BRAKE POWER OF McFARLAN

Q—Publish a picture of the McFarlan 6 engine.

2—What is its brake hp.?

3—What is the speed of this car?

4—Publish a picture of the Mercer engine.

5—The Marmon engine.

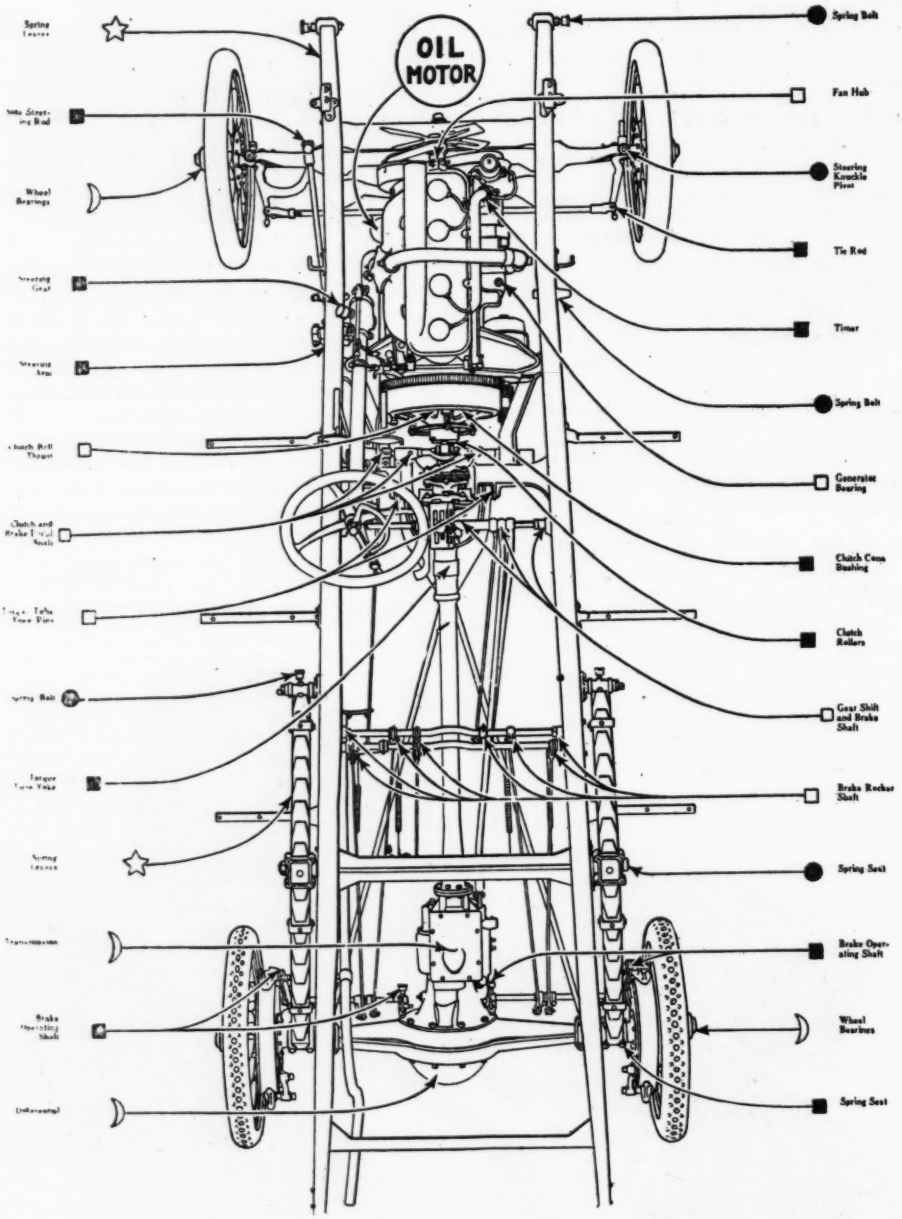
6—What brake hp. does this engine develop?

7—Why did the Sunbeam cars drop out of the Indianapolis race?

8—What is the weight of the Packard 3-35, Mercer six-passenger, Cadillac seven-passenger, Stutz seven-passenger, McFarlan seven-passenger, Marmon seven-passenger and Franklin.—T. J. Babb, Inez, Tex.

1—The McFarlan engine is shown in Fig. 11.

2—The maximum brake hp. of this en-



○ Oil every 150 miles or each day.

● Grease every 150 miles or each day.

□ Oil every 450 miles or each week.

■ Grease every 450 miles or each week.

☆ Oil every 1500 miles or each month.

☽ Give attention each season.

In using the above chart, it should be remembered that the instructions as given above cannot apply under all conditions of operation. If the car is driven 150 miles each day these instructions will apply. Should it be driven only a few miles, those points requiring oil only should be given attention each day. Those points requiring grease should be attended every 150 miles. The reason for this is that the oil evaporates while the car is standing, while the evaporation of the volatile elements of the grease is negligible.

Those points which are designated as needing attention each season should be given attention every 5000 or 6000 miles.

Always use lubricant of the best quality obtainable.

Fig. 9—Lubrication chart for the Willys-Knight model 88-4

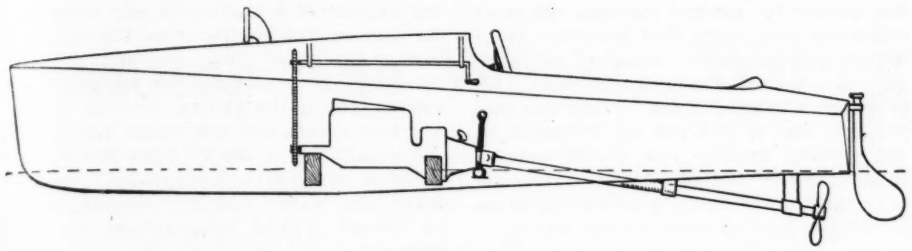


Fig. 10—General outline of installation of Ford engine in motorboat

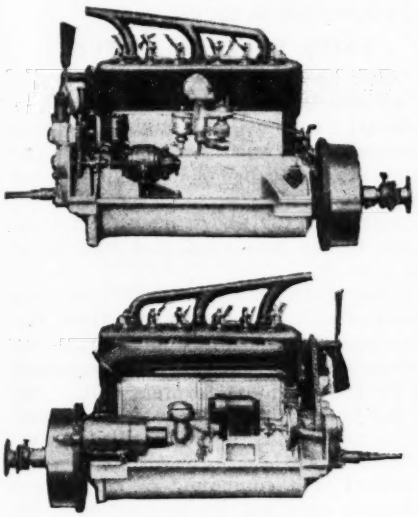


Fig. 11—Right and left views of engine used in McFarlan car

gine is given as 100 at 1850 r.p.m.

3—Using 35 by 5 in. tires as this car does, and having a gear ratio of 3.50 to 1, the car speed at the maximum engine of 1850 r.p.m. is about 56 m.p.h.

4—The Mercer engine is shown in Fig. 15.

5—The Marmon engine is shown in Fig. 14.

6—The Marmon engine develops 74 hp. at 2450 r.p.m.

7—The Sunbeam cars entered at the Indianapolis speedway last May were withdrawn because it was found that the

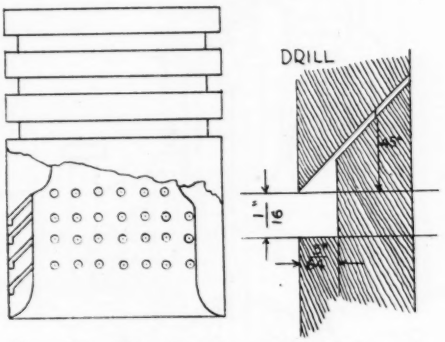


Fig. 13—Showing the method of cutting grooves in piston to eliminate oil fouling

whole structure of the car developed a critical vibration at the speed at which the race was to be run. The peculiar construction of the Indianapolis speedway helped to bring this "period" out, and if the Brooklands track in England had been available for use in the tests, it is probable that this would have been discovered in time.

8—The Packard 3-35 weighs about 4490 lb., the six-passenger Mercer about 3900 lb., the McFarlan 4465 lb., the Marmon 3450 lb., the Franklin 2445 lb. The other cars given in your list are not known.

DETERMINING PISTON DISPLACEMENT

Q—Publish the formula to figure cylinder displacement bore and stroke.

2—Publish diagram of some racing 4-cylinder engine showing water jacket and oiling system.

3—In a racing engine do they use aluminum pistons and connecting rods, and roller bearings in crankshaft?

4—Did the drivers of race cars at Elgin and Uniontown races own their cars?

5—Is the Duesenberg a stock engine?—E. J. Urban, Chicago.

1—The formula for displacement is expressed:

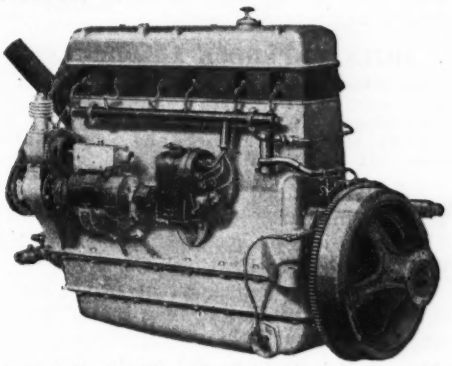


Fig. 14—Left-hand view of engine used in Marmon 34

$$\text{Displacement} = d^2 \times .7854 \times N \times S.$$

Where d is the bore of the engine in inches, N the number of cylinders and S the stroke in inches.

2—See Figs. 16 and 17.

3—Aluminum pistons are generally used in racing engines, but the connecting rods are of drop forged steel. Some racing engines have had ball bearing crankshafts, but this is not common practice. The old Stutz engine had ball bearing crankshafts as the illustration in Fig. 16 shows. The Peugeot cars also had ball bearing crankshafts.

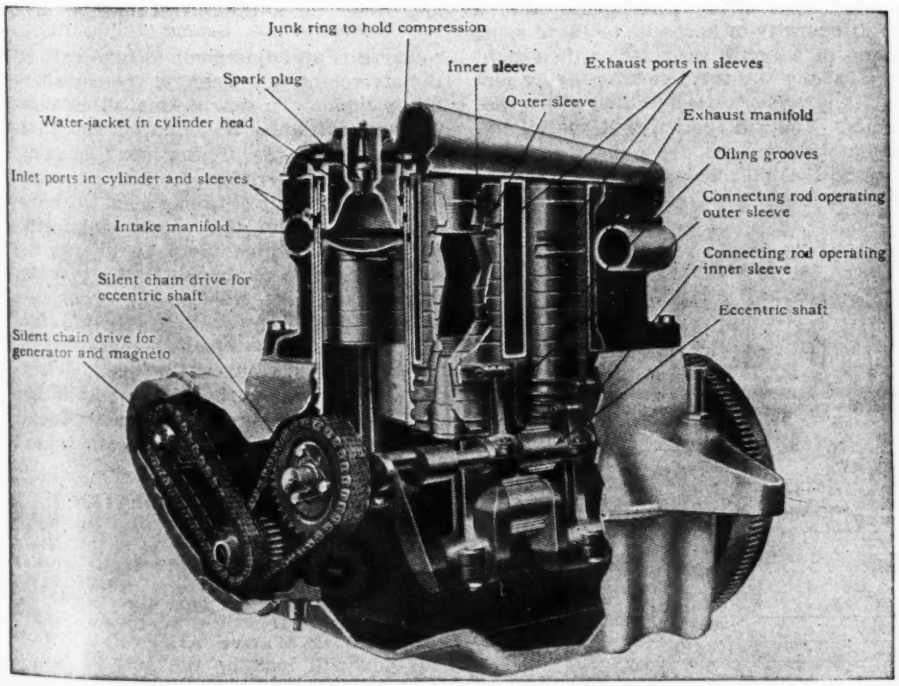


Fig. 12—Phantom view of Willys-Knight engine showing how the oil is distributed to the sleeves

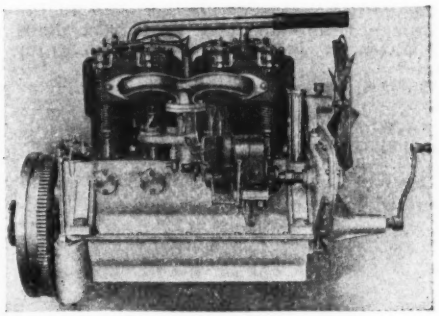


Fig. 15—Right-hand view of Mercer engine

4—Some of the drivers owned their cars, but this is not true in most cases, for as a rule the majority of the drivers pilot the cars for the owner.

5—We suppose that you mean the eight-cylinder Duesenberg engine, which has performed so creditably in the races this year. We hardly believe these engines

can be called stock, because they were made especially for racing purposes, and incidentally they represent the only departure from racing car standards in American design this year.

Miscellaneous

REMOVING REAR WHEELS

Q—Instruct how to remove the rear wheels from a Model A 1912 Detroiter four-cylinder, five-passenger floating rear axle.—Ira P. Hayes, Eckford, Mich.

The rear wheels are mounted on the taper ends of the driveshafts and held in place by a key and nut. The latter must be removed and the wheel can be taken off by a wheel puller. Sometimes tapping the end of the axle shaft lightly with a hammer will assist.

ADJUSTING SHOCK ABSORBERS

Q—What make of shock absorbers were used on the Mercer 22-72?
2—Where can I buy parts for them?
3—Show adjustments and sectional view.—M. H. Elder, Atlanta, Ga.

1—The Hartford shock absorber was used on this car.

2—Parts can be secured from Edward V. Hartford, Inc., Hartford, Conn.

3—To adjust the shock absorber use an ordinary wrench and turn the adjusting nut to the right, or clockwise, to increase the friction, and to the left or counter-clockwise, to decrease it.

Before attempting to adjust the shock absorbers, try the riding qualities of the car over a combination of good and bad roads. Then apply just enough tension to check the rebound of the springs on the bad roads, but be careful not to increase the tension to a point where it will interfere with the easy riding qualities of the car on smooth roads.

KEROSENE IN COOLING SYSTEM

Q—Is it possible to use kerosene in the Fordson tractor cooling system in place of water as water freezes in the winter time?
2—Is it all right to use heavy polarine oil?
3—What is its flash point?—Andrew L. Knobel, Elm Creek, Nebraska.

1—We do not advise you to use kerosene in the cooling system of your Fordson tractor for several reasons, the most important one being that kerosene is so different from water. It takes .47 B.t.u. to heat 1 lb. of kerosene and to heat 1 lb. of water it takes 1 B.t.u. From this you can see that if you use all kerosene in the cooling system you would need a capacity twice that of the water circulating system in order to produce the same result and cool as much as the water.

Another reason that kerosene should not be used is that its boiling point is higher than water. The final reason we wish to point out can be aptly demonstrated by a little experiment. Add a small quantity of kerosene or oil to some water in a bottle provided with a tight cork, shake the mixture thoroughly and then allow the bottle to stand a few moments. You will notice that the oil immediately separates from the water and rises to the top. The same effect results when this mixture is applied to the cooling system of a tractor of any radiator. As soon as the engine stops the circulation of the water stops, except that little bit which is caused by the convectional current set up the natural cooling. These are very small, and will in no way affect the separating of the oil from the water. As soon as the oil has separated from the water the water will immediately begin to freeze if the temperature is cold enough.

2—See 1.

3—About 425 to 450 deg. F.

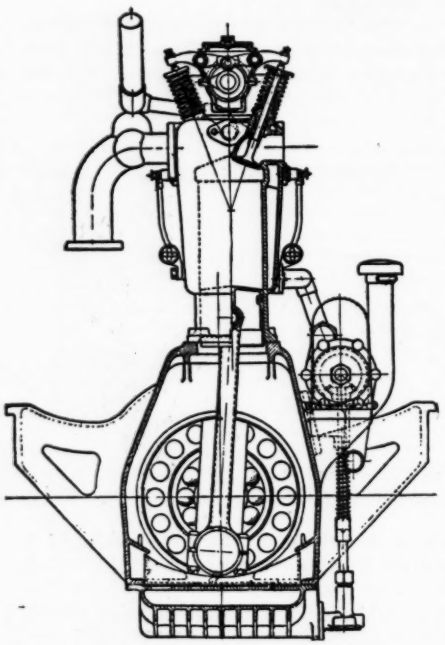


Fig. 16—Cross-sectional view of Stutz racing engine showing water jackets and ball bearing crankshaft

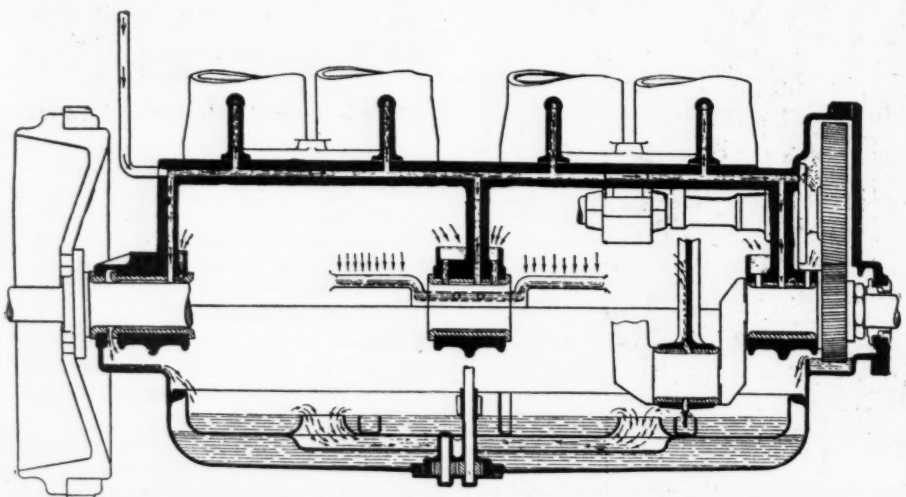


Fig. 17—The National racing engine showing system of lubrication

USING BENZOLE AS FUEL

Under this caption in the issue of Oct. 2, we said that "Benzol when used in an internal combustion engine requires more air than gasoline for its complete combustion, because of the higher carbon content."

Regarding the above mentioned statement, it was contended that such is not the case.

Some years ago, when better fuel was obtainable, it was generally agreed that gasoline most closely approximated the hydrocarbon Hexane, which is represented by the chemical formula C_6H_{14}. This is the series that represents the petroleum compounds and is ordinarily expressed as C_nH_{2n+2}.

Benzol is a compound of carbon and hydrogen also, but the proportion of the two elements is different in this case. It is not entirely agreed what the exact composition of benzol is, but the formula C_6H_6, it is generally conceded by chemists, represents it very nearly. From this it is clear to see that there is more than twice the amount of carbon in benzol that there is in gasoline, and for its complete combustion more air is of course necessary.

ADJUSTMENT ON STEARNS-KNIGHT

Q—If there is an adjustment to tighten the silent chain that drives the generator and timer on a Stearns Knight 4, give same.—Emerson L. Soland, Niota, Ill.

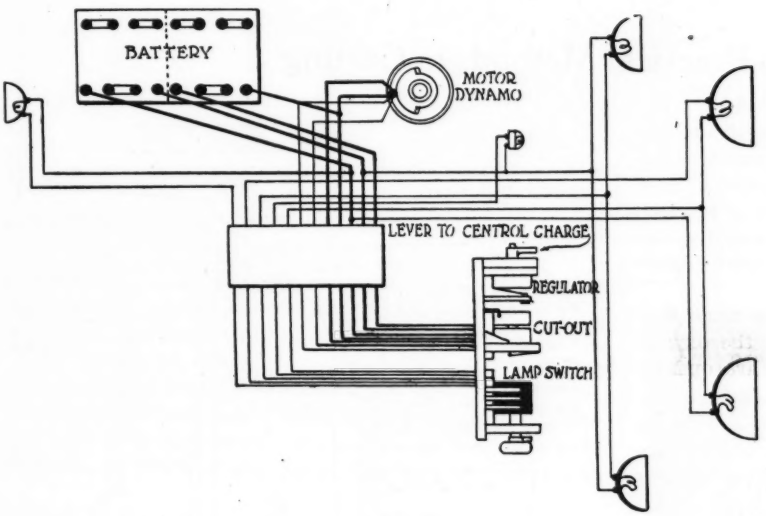
There is an adjustment to take care of the stretching and wear on the camshaft drive chain. To get at this adjustment the radiator must be removed and then the cover of the timing gear housing should next be removed, thus exposing the driving chain. It happens we have no illustration of this chain equipment, but you will notice there an idler gear set on an eccentric bushing. By turning this bushing one way or the other the gear is moved outward, tightening the chain, the total movement being equal to the length of one link of the chain. When this eccentric is turned to its limit the eccentric should be reset to the minimum position and a link of the chain taken out.

NON-STALL DIFFERENTIAL

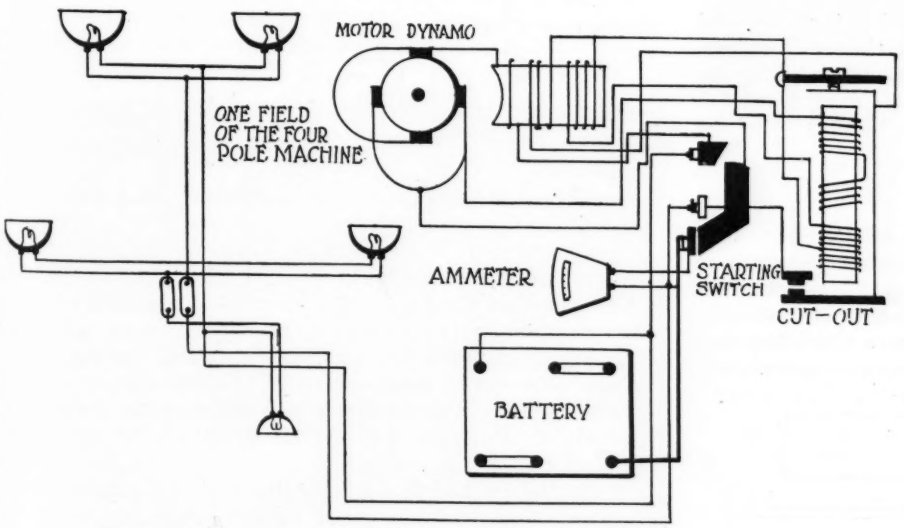
Q—Illustrate and explain how the lock in a differential works in a H & K differential. That is, how a differential works which makes both wheels pull when one is in a mudhole, and will then allow a car to turn a corner. How is this accomplished? —Bryan Burk, Warren, Ark.

If you will look up the July 31 issue of MOTOR AGE and refer to page 39, you will note therein described the action of a non-stall differential.

Motor Age Weekly Wiring Chart No. 51



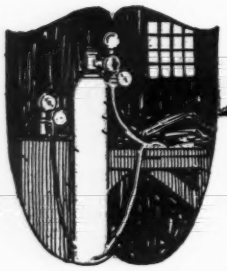
Wiring diagram of the 1913 *Croxton Keeton car*



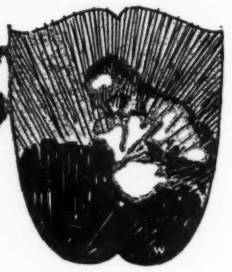
Wiring diagram of the Jessco system as used on the Cutting car

Croxton-Kecton, 1913, and Cutting Car

Abbott—March 27
Alco—April 24
Alter—Nov. 4
Apperson—March 6
Brisco—Oct. 16
Buick—Nov. 21-April 3-Oct. 23
Cadilac—Dec. 9
Cartecar—May 1
Case—Feb. 27-Oct. 2
Chalmers—eFb. 20-March 27
Chandler—April 3
Chevrolet—Nov. 28-March 27
Cole—Jan. 23-April 3
Crow-Elkhart—June 26
Davis—May 8
Detroiter—March 6
Dodge—Dec. 12
Rort—March 13
Elgin—Feb. 27
Empire—March 18-Oct. 30
Essex—Oct. 23
Ford—Jan. 30-Feb. 6-May 15, 22
Franklin—June 19
Grant—Feb. 28-March 27
Haynes—Oct. 9
Henderson—April 3
Hudson—Dec. 5-May 1
Hupmobile—Feb. 13-Oct. 16
King—July 3
Krit—Feb. 6
Lexington—April 24
Little—March 20
Locomobile—Jan. 23-April 17
Maxwell—Jan. 16-Aug. 14
Marion—March 6-20
Mercer—Jan. 23-Aug. 28
Michigan—March 20
Mitchell—Jan. 9
Monroe—Oct. 30
Murray—May 1
National—June 19
Oakland—Jen. 2-Oct. 16
Overland—Nov. 7-14
Owen-Magnetic—Sept. 8
Packard—June 19-July 31
Paige—July 3
Paterson—July 3
Paterson—Mar. 20-June 20
Pierce-Arrow—Oct. 2
Premier—April 10
Pullman—April 10
Regal—Feb. 6-April 10
Reo—Feb. 27-Aug. 31-Oct. 9
Saxon—April 17
Scripps-Booth—Dec. 26
Simplex—April 17
Stanley—June 20
Stearns-Knight—April 24
Studebaker—Dec. 26
Stutz—Jan. 23
Velie—April 24-Sept. 25
Special Systems for Fords—May 15-22
General Battery Charging—May 29
General Battery Charging—May 29-Sept. 25
General Magneto Diagram—June 5
Internal Conections—July 10-17-24



Autogenous Welding in Automotive Repairs



By Thomas P. Bowman

This is the twentieth installment of a series of articles which are being published in MOTOR AGE each week. The author has had practical experience in motor car repairshops which enables him to present first-hand information on practical welding in a clear and concise manner. No difficulty should be encountered in this work, provided the reader will apply all the methods given herein.—Editor.

Part XX—Practical Methods in Cutting

THE cutting blowpipe is connected almost exactly as the welding blowpipe, the only difference in the apparatus being that a heavier regulator for the oxygen cylinder is used and the hose from this regulator to the blowpipe is heavier. This is because a heavier oxygen pressure is usually employed in cutting. The acetylene pressure is never higher than in welding.

After the apparatus is connected in exactly the same way and in the same order as the welding blowpipe, the oxygen cylinder valve and the acetylene cylinder valve are opened. Proper oxygen pressure to be used for the particular thickness of the steel to be cut is shown in the cutting table on this page. Then establish this pressure with the cutting valve open. Be sure not to adjust this pressure with the cutting valve closed.

The cutting blowpipe is slightly different from the welding blowpipe, there being several holes surrounding a large central hole in the nozzle. From the smaller holes there issues an oxy-acetylene flame which is used for preheating. From the central hole issues a jet of pure oxygen for cutting. There are three valves on the blowpipe, one controlling the acetylene, another controlling the oxygen for the preheating flame, and the third controlling the cutting oxygen. The first two valves are regulated exactly as welding blowpipe valves because they must produce a neutral flame in the preheating jets. These jets are used to heat the steel so that the central jet of oxygen will burn through the steel.

After the preheating flames have been adjusted with the cutting oxygen valve wide open, the cutting oxygen valve is closed, leaving the preheating flames only burning. The apparatus is now ready for cutting.

METHOD NO 55

The object of this is to give practice in cutting ½-in. steel plate. Take a piece of steel plate and draw a line on it to be followed in cutting. This line should be made with chalk, soapstone or center punch marks so it will not burn off.

Place the preheating flames of the blowpipe which has been lighted, in accordance with the instructions previously given,

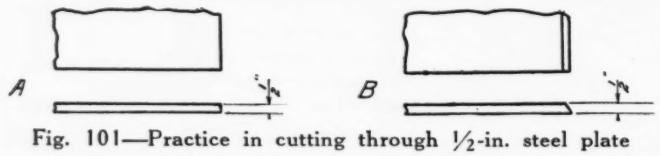


Fig. 101—Practice in cutting through ½-in. steel plate

to the upper edge of the plate, at the point where the cut is to be started. The preheating flame should be so placed that about ⅛ in. of the metal from the edge is heated. This should be brought to a bright red heat. When this temperature is reached, the cutting jet is turned on by means of the

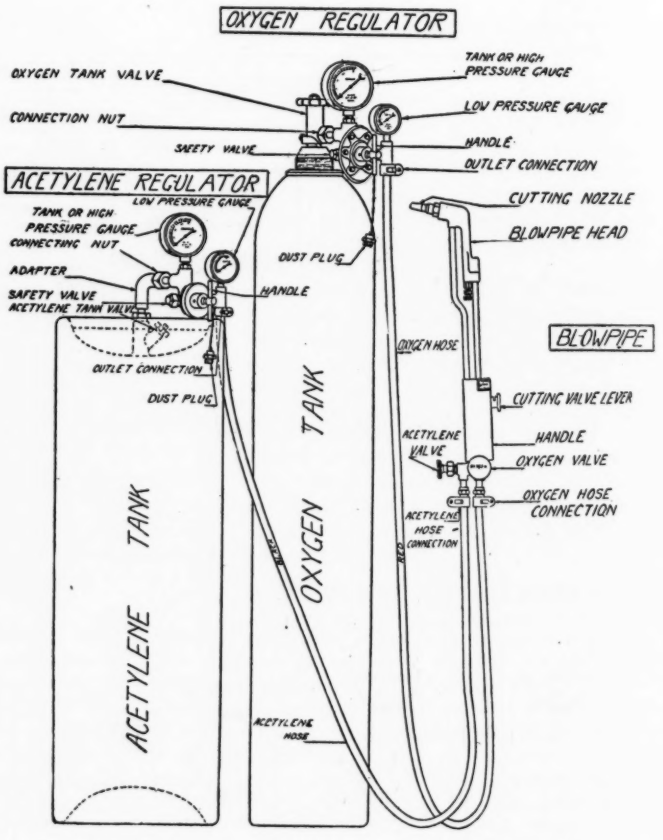


Fig. 102—Layout of oxy-acetylene cutting unit

cutting valve. It will immediately burn out the steel, which will be shown by a great number of sparks and melted slag dropping from the plate. The blowpipe is then moved along the line previously marked out, at a speed which will allow the oxygen to burn the steel through along the line. This speed will come by practice. If the blowpipe travels too fast, the metal will not be preheated, and therefore the oxygen will not cut it. If the blowpipe travels too slowly the same thing will occur.

After the cut has been started, the preheating flame should be carried so that the tips of the flame will just reach the plate. After skill has been acquired, it will be possible to carry the flame ⅛ in. or ¼ in. from the plate. The novice should practice on the plate until he has mastered the fundamentals of cutting. After he has succeeded in making a cut he should try to produce as smooth and fast a cut as possible. For smooth cutting there are three points to be watched: First, the preheating flame should be kept as

Oxy-Acetylene Cutting Table

Thickness of Metal In.	Size of Internal Nozzle	Oxygen Pressure Lb.-Sq. 1 In.	Per Hour				Per Linear Foot	
			Speed		Gas Consumption		Gas Consumption	
			Machine Lin. Ft.	Hand Lin. Ft.	Oxygen Cu. Ft.	Acetylene Cu. Ft.	Oxygen Cu. Ft.	Acetylene Cu. Ft.
1/8	No. 1	10	120	90	28	7.8	0.31	0.09
1/4		15	93	74	37	11.3	0.50	0.15
3/8		20	81	62	48	14.2	0.67	0.23
1/2		25	73	55	58	16.3	1.05	0.30
3/4		30	63	46	80	19.7	1.74	0.43
1		35	57	40	100	22.0	2.50	0.55
1 1/4	No. 2	35	53	36	120	23.6	3.33	0.66
1 1/2		40	50	33	141	25.3	4.27	0.77
2		45	46	29	184	27.7	6.34	0.96
3		55	41	24	268	31.9	11.2	1.33
4	No. 3	65	36	20	352	35.6	17.6	1.78
5		75	32	17	436	38.8	25.7	2.28
6		85	29	15	522	41.5	34.8	2.76
8		95	23	11	698	46.2	63.4	4.2
10	No. 4	115	18	8	880	50.3	110.0	6.3
12		135	15	6	1080	53.9	180.0	9.0
14		155	12		1290	57.3		
16		175	10		1520	60.4		
	Rivet Nozzle	40			240	25.0		

small as possible; second, the oxygen pressure should be kept so it will blow the slag clear through but will not be excessive; third, the speed of the cutting should be constant and should be as fast as possible for the oxygen to burn the metal out. If too large a preheating flame is used the top edges of the plate will be melted down. Do not use an oxidizing preheating flame, as this will also cause the edges to oxidize and melt.

In cutting a plate the left hand should grasp the blowpipe about 6 in. from the head. Because of the heat that will be reflected, the student should wear an asbestos glove on his hand. The right hand should grasp the handle of the blowpipe so the thumb or finger will be in contact with the cutting valve. In order to make a smooth cut, it is necessary that steadiness with which it is carried on. When it is necessary the hand be steadied. This may be done by resting the left hand on the plate. The smoothness of the cut depends on the to make a bevel cut, the same method is used as described above, except that the blowpipe is held so that a cut is made on an angle to the surface of the plate.



Fig. 103—Adoption of carbon remover to service station engine carbon remover

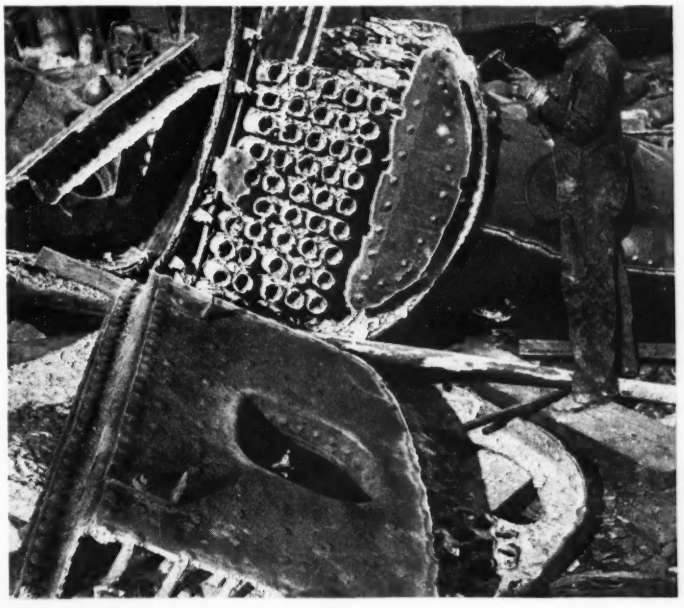


Fig. 104—This 14-ton marine boiler was cut into scrap in 1½ days

METHOD NO. 56

Cutting of 1 in. plate will be a little more difficult than the previous method because the plate is thicker and therefore greater care must be taken to keep the plate properly preheated and to carry the oxygen jet forward regularly. The cutting pressure should be raised according to the table and the proper nozzles used. The making of a bevel cut is carried

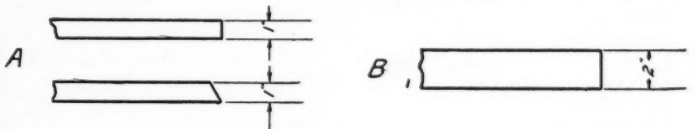


Fig. 105—Cutting 1-in. steel plate

on exactly by the same method as previously described, with the added precautions that apply to heavier cutting.

Part B of this method gives practice in cutting 2-in. bars or plates. This is carried on exactly as in light sections, except that a larger nozzle should be used and the cutting oxygen pressure is that shown in the table for this thickness.

Motor Age Winter Service Maintenance Data Sheet

Cooling Water Capacities for 1919 and 1920 Cars

Car	In Gallons 1919	1920
Allen	6¼	6¼
American	2½	2½
Anderson	4½	4¾
Apperson	9½	9½
Argonne	...	5
Auburn	3¼	3¼
Beggs	6	6½
Biddle	4½	4½
Bour-Davis	3½	4¾
Brewster	7	7
Briscoe, 4-24	3¼	...
Briscoe, 4-34	...	4
Buick	5	...
Cadillac, 57	6	...
Case	4½	4½
Chalmers	6½	6½
Chandler	4	4
Champion	5	5
Champion—Special	5	5
Chevrolet, 490	1¾	1¾
Chevrolet, FB	2⅞	2⅞
Chevrolet, T	3⅛	3⅛
Cleveland	3	3
Climber	5	6
Cole	5¾	...
Columbia	4	4
Comet	5	5
Commonwealth	8	8
Crawford	3	3
Crow-Elkhart	6	6
Cunningham	9	9
Daniels	8½	10
Dixie Flyer	4½	5½
Dodge Brothers	3⅝	...
Dorris, 6-80	4¾	4¾
Dort	4¾	4¾
Elcar	5	5
Elgin	4	4
Essex	6	6
Ford	2⅞	2⅞
Franklin	Air	cooled
Geronimo	5	5
Grant	3¾	4¼
Hackett	3⅔	4
Hatfield	4¼	4¾
Haynes	7½	7½
Highlander	4	...
Hollier	4½	4½
Holmes	Air	cooled
Hudson	4¼	4¼
Hupmobile	6	6
Jones	5½	6½
Jordan	4¼	...
King	8	9
KisselKar	6¾	6¾
Klinekar	8	8½
Lenox	5½	5½
Lexington	4¼	4¼
Liberty	6½	6½
Locomobile	8	8
Maibohm	3½	3½
Marmon	5¾	5¼
Maxwell	3	3⅛

Car	In Gallons 1919	1920
McFarlan	9	9
Mercer	7¼	7¼
Metz	3½	3½
Mitchell	4¾	4¾
Moline-Knight, L	5½	...
Moline-Knight, J	...	7¾
Moline-Knight, R	...	5½
Monitor	5	6
Moon, Victory	5	5
Moon, 6-66	5½	5½
Moore	4¾	5
Nash	5	5
National	...	6–7
Nelson	3½	3½
Oakland	2¼	...
Oldsmobile, 45B	5	...
Oldsmobile, 37A	3	...
Olympian	5	5
Overland, 4	3½	3½
Owen Magnetic	...	6¼
Packard, 325 and 335	8½	...
Paige, 6-55	7½	...
Paige, 6-39 and 6-40	4½	...
Pan American	3½	4½
Paterson	3⅛	...
Peerless	4½	4½
Piedmont	3½	3½
Pierce-Arrow, 38	6½	...
Pierce-Arrow, 48	7⅝	...
Pilot	5	5
Porter	...	8
Premier, 6-C	6	...
Reo, T and U	3¼	...
Reo, T6 and U6	...	3¼
Revere	10	10
Roamer	6⅛	6¼
Saxon	4⅞	...
Sayers	4½	4½
Scripps-Booth	3½	3
Seneca	3 15/16	4
Singer	10½	10½
Standard	7½	7¾
Stanley	Steam	car
Stearns	6	6
Stephens	7	7
Studebaker, EG	4¼	...
Studebaker, EH	4½	...
Studebaker, SH	3¼	...
Stutz, Series G	6¼	...
Stutz, Series H	...	6¼
Templar	4½	4½
Velie, 38	4¾	...
Velie, 34	...	4⅛
Velie, 48	...	4⅝
Westcott, A-48	5½	...
Westcott, A-38	5	...
Westcott, B-38	5	...
Westcott, C-48	...	5½
Westcott, C-38	...	5
Winton, 24	7½	...
Winton, 25	8	...
Winton 25	...	8
Wolverine	5	5

Motor Age Winter Service Maintenance Data Sheet

Exhaust Pipe Diameters for 1919 and 1920

Passenger Cars

Car	1919 In Inches	1920 In Inches
Allen	2″	2″
American	2¼″	2¼″
Anderson	2½″	2¼″
Apperson	1¾″	1¾″
Argonne	....	2½″
Auburn	2″	2″
Beggs	2½″	2¼″
Biddle	2¼″	2¼″
Bour-Davis	2¼″	2¼″
Brewster	2¾″	2¾″
Briscoe, 4-24	1¾″	....
Briscoe, 4-34	....	1¾″
Buick	....	....
Cadillac	1¾″	....
Case	2¼″	2¼″
Chalmers	2⅜″	2⅜″
Chandler	2″	2″
Champion	5″	5″
Champion, Special	2⅜″	2⅜″
Chevrolet, 490	1½″	1½″
Chevrolet, FB	2″	2″
Chevrolet, T	2″	2″
Cleveland	2″	2″
Climber	2″	2¼″
Climber	2″	2″
Cole	2⅝″	....
Columbia	2″	2″
Comet	2½″	2½″
Commonwealth	2½″	2½″
Crawford	2¼″	2¼″
Crow-Elkhart	2¼″	2¼″
Cunningham	2¼″	2¼″
Daniels	1¾″	1⅞″
Dixie Flyer	2⅜″	2⅜″
Dodge Brothers	2″	....
Dorris, 6-80	2½″	2½″
Dort	2¼″	2¼″
Douglas	2¾″	2¾″
Elcar	2⅜″	2⅜″
Elgin	2″	2″
Essex	2″	2″
Ford	1½″	1½″
Franklin	1½″	1½″
Geronimo	2¼″	2¼″
Grant	1¾″	2″
Hackett	1¾″	2″
Hatfield	1¾″	2″
Haynes	2⅜″	2⅜″
Highlander	2¼″	....
Hollier	2″	2½″
Hudson	2¼″	2¼″
Hupmobile	1¾″	1¾″
Jordan	2¼″	2¼″
King	1¾″	1¾″
KisselKar	2¾″	2¾″
Klinekar	2″	2″
Lenox	2½″	2½″
Lexington	....	....
Liberty	2″	2″
Locomobile	2½″	2½″
Maibohm	2″	2″
Marmon	2¼″	3″
Maxwell	1⅝″	1⅝″
McFarlan	3¼″	3¼″
Mercer	3″	3″
Metz	2 3/16″	2 3/16″
Mitchell	2¼″	2¼″
Moline-Knight, L	2½″	....
Moline-Knight, All	....	2½″
Monitor	....	....
Moon, Victory	2½″	2¼″
Moon, 6-66	2¼″	2¼″
Moore	1¾″	2″
Nash	2″	2″
National	....	2½″
Nelson	1½″	1½″
Oakland	2¼″	....
Oldsmobile, 45B	1¾″	....
Oldsmobile, 37A	1¾″	....
Olympian	1¼″	1¼″
Overland, 4	2″	2″
Owen Magnetic	....	2⅝″
Packard, 325 and 335	2¼″	....
Paige, 6-55	2¼″	....
Paige, 6-39 and 6-40	2″	....
Pan American	2¼″	2¼″
Paterson	2″	....
Peerless	1⅞″	1⅞″
Piedmont	....	....
Pierce-Arrow, 38	2⅞″	....
Pierce-Arrow, 48	3¼″	....
Pilot	2¼″	2¼″
Reo, T and U	2½″	....
Reo, T6 and U6	....	2½″
Revere	3″	3″
Roamer	2¼″	2¼″
Saxon	1¾″	....
Sayers	2″	2″
Scripps-Booth	2¼″	2¼″
Seneca	1½″	1½″
Singer	2½″	2½″
Standard	1⅝″	1⅝″
Stanley	Steam car	
Stearns	2¼″	2¼″
Stephens	2¼″	2¼″
Studebaker, EG, EH and SH	2″	....
Stutz, G	3″	....
Stutz, H	....	....
Templar	2″	2″
Velie, 38	2½″	....
Velie, 34	....	2″
Velie, 48	....	2¼″
Westcott, A-48 and B-38	2¼″	....
Westcott, A-38	2″	....
Westcott, C-38 and 48	....	2¼″
Winton, 24	3″	....
Winton, 25	2½″	....
Winton, 25	....	8″
Wolverine	3″	3″

1915-1916-1917-1918 Cars

Name	1915	1916	1917	1918
Abbott-Detroit	....	2″	....	....
Abbott-Detroit	....	1½″	....	....
Abbott-Detroit	....	....	2″	2¼″
Allen	....	1¾″	1¾″	1¾″

Motor Age Winter Service Maintenance Data Sheet

Exhaust Pipe Diameter for 1915, 1916, 1917 and 1918

Passenger Cars (Continued)

Car	1915	1916	1917	1918
American	....	....	1¾″	2¼″
Ames Kentucky	2″	2″	2″	2″
Apperson	2¼″	2¼″	....	....
Apperson	....	....	2″	....
Apperson	....	....	....	1¾″
Apperson	....	....	....	2¼″
Auburn	2⅜″	2⅜″	....	....
Auburn	....	2¼″	....	....
Auburn	....	....	2″	2″
Austin	3″	3″	....	....
Austin	....	....	2¼″	2¼″
Autocar	1¾″	1¾″	1¾″	1¾″
Bell	....	2⅜″	....	....
Bell	....	....	....	2¼″
Bell	....	....	1½″	1¾″
Bour-Davis	....	....	2″	2¼″
Ben Hur	....	....	2¼″	2¼″
Briscoe	1½″	1½″	1¾″	1¾″
Buick	1¾″	1¾″	1¾″	....
Buick	2¼″	2¼″	2¼″	....
Buick	....	....	....	1¾″
Case	....	2¼″	2¼″	2¼″
Cadillac	1¾″	1¾″	1¾″	1¾″
Chalmers	2⅜″	2⅜″	2⅜″	....
Chalmers	2½″	2½″	2½″	....
Chalmers	2¾″	2¾″	2¾″	....
Chalmers	....	....	....	2⅜″
Chandler	2″	2″	2″	2″
Chevrolet	2″	2″	2″	2″
Chevrolet	2″	2″	2″	....
Chevrolet	2⅛″	2⅛″	2⅛″	2″
Chevrolet	....	....	....	1¾″
Cole	....	....	2″	....
Cole	2⅝″	2⅝″	....	....
Cole	....	2⅜″	....	....
Cole	....	....	....	2⅝″
Columbia	....	....	2″	2″
Crawford	2¼″	2¼″	2¼″	2¼″
Crow-Elkhart	....	1⅞″	1⅞″	....
Crow-Elkhart	....	....	....	2″
Cunningham	2¾″	....	....	....
Cunningham	....	2¼″	2¼″	2¼″
Daniels	1¾″	1¾″	1¾″	1¾″
Davis	....	....	2″	....
Davis	....	....	2¼″	....
Detroiter	1½″	2″	....	....
Detroiter	....	2½″	2½″	....
Dile	....	2½″	....	....
Dixie Flyer	....	2⅜″	2⅜″	2⅜″
Dodge Bros	2″	2″	2″	2″
Dorris	3″	3″	3″	3″
Dort	2¼″	2¼″	2¼″	2¼″
Dort	....	....	2¼″	2¼″
Drexel	....	....	2″	....
Drexel	....	....	2½″	....
Elcar	....	2⅜″	2¼″	....
Elcar	....	....	....	2″
Elcar	....	....	....	2⅜″
Elgin	....	....	2¼″	....
Empire	1¾″	2″	2″	2″
Empire	....	2¼″	2¼″	....
Empire	....	....	....	2¼″
Enger	....	....	1¾″	....
Enger	....	....	2″	....
Fiat	2¾″	2¾″	2¾″	2¾″
Ford	1½″	1½″	1½″	1½″
Franklin	2″	2″	....	....
Franklin	....	....	1½″	1½″
Glide	2″	2¼″	2¼″	2¼″
Grant	1¾″	1¾″	1¾″	1¾″
H. A. L	....	2″	2″	2″
Harroun	....	....	1¾″	1¾″
Harvard	....	1¼″	1¼″	....
Haynes	2⅜″	2⅜″	2⅜″	2⅜″
Haynes	....	....	2⅜″	....
Haynes	....	....	1½″	....
Haynes	....	....	....	1¾″
Hollier	....	....	1½″	1½″
Hollier	....	....	....	1¾″
Hudson	2¼″	2¼″	2¼″	2¼″
Hudson	2½″	....	....	....
Hudson	....	....	2¼″	2¼″
Hupmobile	1⅞″	2″	2″	1¾″
Interstate	....	2″	2″	2″
Jackson	2″	2″	....	....
Jackson	....	1¾″	....	....
Jackson	2⅜″	2⅜″	....	....
Jackson	....	....	1⅝″	1⅝″
Jeffery	2¼″	2¼″	....	....
Jordon	....	....	2¼″	2¼″
King	1⅜″	1⅜″	1½″	....
King	....	1½″	1½″	....
King	....	1¾″	1½″	1½″
Kissel Kar	2¾″	2¾″	2¾″	2¾″
Kissel Kar	....	....	....	2″
Kline Kar	....	....	2″	2″
Lexington	....	....	2″	....
Liberty	....	....	2″	2″
Locomobile	2⅜″	2⅜″	2⅜″	....
Locomobile	2¾″	2¾″	2¾″	2¾″
Lozier	2⅛″	2⅛″	2″	....
Marion	2¼″	2¼″	....	....
Marion	....	....	2¼″	2¼″
Marmon	....	2¼″	2¼″	2¼″
Marmon	2½″	2½″	2½″	2½″
Maxwell	1⅝″	1⅝″	1⅝″	1⅝″
McFarlan	....	....	3¼″	3¼″
Metz	1½″	1½″	1½″	1½″
Mitchell	2¼″	2¼″	2¼″	2¼″
Moline-Knight	....	2¾″	2¾″	....
Moline-Knight	....	2⅜″	2⅜″	....
Moline-Knight	....	....	....	2½″
Moline	....	....	2½″	....
Monroe	1½″	1½″	....	....
Monroe	....	....	1⅝″	....
Monroe	....	....	3¾″	....
Moon	2¼″	2¼″	2¼″	1¾″
Moon	....	2″	2″	2″
Moon	....	....	....	1¾″
Moon	....	....	....	2¼″
National	2½″	2¼″	2¼″	2¼″
National	....	2″	2″	2″
New Era	1⅝″	1⅝″	1⅝″	1⅝″
Norwalk	2⅛″	2⅛″	2⅛″	
Norwalk	....	....	....	2¼″
Norwalk	....	....	....	2″
Oakland	....	1¾″	....	....
Oakland	....	2″	....	....
Oakland	....	2⅜″	....	....
Oakland	....	....	2″	....
Oakland	....	....	2″	....
Oakland	....	....	....	2¼″
Oldsmobile	1⅞″	1⅞″	....	....
Oldsmobile	....	1¾″	....	....
Oldsmobile	....	....	1¾″	1¾″
Overland	2″	2″	2″	2″
Overland	2¼″	2¼″	2¼″	2¼″
Overland	....	1¾″	1¾″	1¾″
Overland	....	2½″	2½″	2½″
Overland	....	....	2″	....
Owen Magnetic	2⅜″	2⅜″	2⅜″	2⅜″
Owen Magnetic	....	2¼″	2¼″	2¼″
Owen Magnetic	....	....	2″	....
Owen Magnetic	....	....	....	2⅝″
Packard	....	....	....	....
Packard	....	....	....	2¼″
Paige	2″	2″	....	....
Paige	2¼″	2″	2″	2″
Paige	....	....	2¼″	2¼″
Pathfinder	2¼″	2¼″	....	....
Pathfinder	....	....	2″	....

Motor Age Winter Service Maintenance Data Sheet

Cooling Water Capacities for 1919 and 1920 Trucks

	In Gallons	
	1919	1920
A & B	6	6
Acason, 1, 1½, and 2-ton	6¼	6¼
Acason, 3½-ton	7	7
Acason, 5-ton	7¼	7¼
Ace	7	7
Acme, B, F, and A	5½	....
Acme, C	9	....
Acme, E	10¼	....
All-American, 1-ton	6¼	6¼
Apex, 1 and 1½-ton	6	6
Apex, 2½-ton	9	9
Armleder, HW and KW	5½	5½
Atterbury, 7R, 1½-ton	5	5
Atterbury, 7CX, 2½-ton	5	5
Atterbury, 7D, 3½-ton	4⅜	4⅜
Atterbury, 8E, 5-ton	8½	8½
Autocar	4½	4½
Available, H2	5¼	....
Available, H2½	5¼	....
Available, H3	7½	....
Available, H5	12	....
Beck	5	5
Beech Creek	8	8
Bell	7	7
Bessemer, 1-ton	5½	5½
Bessemer, 1½-ton	6½	6½
Bessemer, 2-ton	6½	....
Bessemer, 2½-ton	....	7¼
Bessemer, 3½-ton	7½	....
Bessemer, 4-ton	....	7¾
Bethlehem, D and E	6¾	6¾
Bethlehem, F	7½	7½
Brinton	8¼	8¼
Brockway, J	5¼	....
Brockway, K3	6	....
Brockway, R	7	....
Brockway, S	5⅝	....
Brockway, T	11	....
Brockway, S2	....	5⅝
Brockway, K4	....	6¾
Brockway, R2	....	7⅛
Brockway, T	....	11
Clydesdale, 90 and 120B	10½	10½
Clydesdale, 32, 42, 65 and 65X	9	9
Clydesdale, 65E and 65EX	9½	9½
Columbia	6	6
Commerce	5	5
Conestoga	7	7
Corbitt, AA	9	9
Corbitt, A and B	8	8
Corbitt, C	6½	6½
Corbitt, D	6	6
Corbitt, E	5½	5½
Couple-Gear	4⅜	4⅜
Dort, E, 1-ton	5	....
Dort, CC4, 2-ton	7	....
Dort, L, 3½-ton	9	....
D-E, 1 and 1½-ton	5	....
D-E, 2-ton	6	....
D-E, 2½ and 3½-ton	5½	....
D-E, 5-ton	9	....
Defiance	6	6
DeKalb	8	8
Denby, 12 and 13	4¾	....
Denby, 27 and 210	....	11¾
Dependable, E	8	....
Dependable, C	....	7
Diamond T, J5 and J4	4¾	4¾
Diamond T, J3	5⅛	5⅛
Diamond T, LB and R	6¼	6¼
Doane, 2½-ton	8	8
Doane, 6-ton	9	9
Dorris, K-4 and K-7	4⅛	4⅛
Douglas	7–9	7–9
Duplex	6½	....
Ellsworth	3	3
Fageol	....	....
Famous	6	6
Fargo	9	9

	In Gallons	
NAME	1919	1920
Federal, SD	4½	4½
Federal, TE and UE	5	5
Federal, WD and XC	6½	6½
Ford	2⅞	2⅞
Forschler	....	....
F-W-D	10½	10½
Fulton	5	5
Gabriel, E	9	....
Gabriel, F	12	....
Gabriel, E	....	9
Gabriel, F	....	12
Garford	9	9
Gary	....	....
G M C, 16	3¾	3¾
G M C, 21, 31 and 41	6	6
G M C, 71 and 101	7¼	7¼
Giant, 15	7	7
Giant, 16	8	8
Giant, 17	9	9
Globe	5	5
Gramm-Berstein, 15	6½	6½
Gramm-Berstein, 20	7⅛	7⅛
Gramm-Berstein, 25	9½	9½
Gramm-Berstein, 35	9½	9½
Gramm-Berstein, 50	10¼	10¼
Grant, 10, 11, 12, 15 and 16	4½	4½
Hall, 2-ton	6½	6½
Hall, 3½ and 5-ton	10	10
Harvey, WEA	7	....
Harvey, WFA	9	....
Harvey, WHA and WKA	14	....
Hebb, ¾-ton	5¾	5¾
Hebb, 1½-ton	7	7
Hebb, 2½-ton	7¼	7¼
Higrade	2	2
Highway Knight	4¼	4¼
Hoover	4	4
Huffman	5½	5½
I. H. C., F, H and K	6½	6½
I. H. C., G	9½	9½
Independent, F	5¾	5¾
Independent, G and H	5½	5½
Indiana, 12	6	6
Indiana, 20 and 25	7	7
Indiana, 35	7½	7½
Indiana, 50	8¼	8¼
Kankakee	9	9
Keldon	7	7
Kelly-Springfield, 1½ and 2½-ton	9¾	9¾
Kelly-Springfield, 3½, 4, 5 and 6-ton	16½	16½
Kissel	6¾	6¾
Kleiber	9–10	9–10
Koehler, C	7	7
Koehler, M	9	9
Lane	9	9
Larrabee	6–12	6–12
Locomobile	7½	7½
Mack, AB	3¼	3¼
Mack, AC	10½	10½
Master, 1½-ton	4¼	4¼
Master, 2-ton	5¼	5¼
Master, 3½-ton	6½	6½
Master, 5-ton	7	7
Maxwell	....	....
Menominee	8	8
Melitor	Air-Cooled	
Moreland, 1½-ton	6	6
Moreland, 2½-ton	7½	7½
Moreland, 4-ton	11	11
Muskegon	6	6
Mutual	....	9¼
Myers, 1-ton	5	5
Myers, 1½-ton	6	6
Napoleon	8	8
Nash, 2018, 1-ton	5½	....
Nash, 3018, 2-ton	5½	....
Nash, 4017, Quad	10	....
Nelson & LeMoon	7	7
Netco	4½	4½

Motor Age Winter Service Maintenance Data Sheet

Cooling Water Capacities for 1919 and 1920 Trucks (Continued)

Truck	In Gallons 1919	1920
New York	4	4
Noble	....	....
Northway, 2-ton	6¾	....
Northway, 3½-ton	8	....
Oldsmobile	5	....
Oneida, A, 1-ton	4½	4½
Oneida, B, 1½-ton	4¾	4¾
Oneida, C, 2-ton	4¾	4¾
Oneida, D, 3½-ton	7¼	7¼
Oneida, E, 5-ton	9	9
Oshkosh	5	5
Packard, E, 1½ and 2-ton	7	7
Packard, 3 and 4-ton	9½	9½
Packard, 5 and 6-ton	10	10
Paige, 50	7	....
Paige, 51	7½	....
Parker, F	....	6½
Parker, J	....	7
Parker, M	....	11
Phoenix	....	7
Pierce-Arrow	....	....
Power, B	12	....
Power, B, 2-ton	....	12
Ranier, R-6 and 11	4¼	4¼
Ranier, R-8	5	5
Reliance	9	9
Reo, F	2.97	....
Republic, 10 and 11	5½	5½
Republic, 19	7	7
Republic, 20	7½	7½
Schwartz	7	7
Selden, 1½-A	4¾	4¾
Selden, JWBL	2¾	....
Selden, 2½-A	2¼	....
Selden, 3½-A	2¼	2¼
Selden, DL	2¼	....
Selden, 5-A	2½	....
Seneca	....	....
Service, 220, 1-ton	6	6
Service, 31, 1½-ton	5½	5½
Service, 36, 1½-to n	5½	5½
Service, 51, 2½-ton	5½	5½
Service, 71, 3½-ton	5½	5½
Service, 76, 3½-ton	10	10
Service, 101, 5-ton	10	10
Shaw, ¾-ton	4¼	4¼
Standard	....	....
Sterling, 1½-ton	....	9
Sterling, 2½-ton	9	9
Sterling, 3½-and 5-ton	10	10

Truck	In Gallons 1919	1920
Sterling, 7-ton	10	....
Sterling, 7½-ton	....	10
Stewart, M11	3½	....
Stewart, M8	4	....
Stewart, M9	4½	....
Stewart, M7	....	5½
Stewart, M10	....	6
Sullivan	....	....
Texan	5	5
Tiffin, GW, 1½-ton	6	6
Tiffin, MW, 2½-ton	6	6
Tiffin, PW, 3½-ton	8	8
Tiffin, TW, 5-ton	10	10
Tiffin, UW, 6-ton	10	10
Titan	10	....
Tower, F	5	....
Tower, G	8	....
Tower, J	....	5
Tower, H	....	6
Tower, G	....	8
Traffic	9	9
Transport	5½	5½
Triangle, A	8½	....
Triangle, B	9	....
Triangle, C	....	8½
Union	9	9
U. S., N	5	....
U. S., H	5¼	....
U. S., J and K	7	....
Velie, 25-B	....	7
Velie, 26-B	....	11
Velie, 46	....	4½
Vim, 21 and 26	3½	3½
Vim, 25	4	4
Vim, 22	6	6
Vim, 23	9	9
Ward La France, 2A	9½	9½
Ward La France, 3½A	8	8
White	....	....
White Hickory, H	4½	4½
Wichita	....	....
Wilcox, A	5½	5½
Wilcox, B, C and D	6	6
Wilcox, W	8	8
Wilson, 1-ton	5	
Wilson, 2-ton	7	
Wilson, 3½ and 5-ton	9	
Winther	9–12	9–12
Witt-Will	8	8
Wolverine	5½	5½

Exhaust Pipe Diameter for 1915, 1916, 1917 and 1918 Passenger Cars (Concluded)

Patterson	....	....	2″	2″
Peerless	3″	....	....	3″
Peerless	2¼″	....	....	....
Peerless	....	1⅞″	....	1⅞″
Peerless	....	....	1⅞″	....
Pierce Arrow	1½″	1½″	....	....
Pierce Arrow	....	....	2⅞″	....
Pierce Arrow	....	....	3¼″	....
Pilliod	....	2¼″	2¼″	....
Premier	....	2¾″	2″	2
Princess	....	....	1¾″	1¾″
Pullman	1¾″	1⅝″	....	....
Pullman	....	....	2¾″	....
Puritan	....	....	2¾″	....
Regal	2″	2″	....	....
Regal	....	1¾″	1¾″	1¾″
Reo	2½″	2½″	2½″	2½″
Roamer	....	....	2¼″	2¼″
Saxon	1½″	1½″	1½″	1½″
Saxon	....	....	1¾″	....
Scripps-Booth	1¼″	1¼″	....	....
Scripps-Booth	....	1½″	....	1½″
Scripps-Booth	....	....	2″	....
Scripps-Booth	....	....	1½″	....
Scripps-Booth	....	....	....	2⅛″
Sphinx	2⅜″	2⅜″	2⅜″	....
Standard	2⅜″	....	....	....
Standard	....	1⅝″	....	....
Standard	....	....	1⅝″	1⅝″
Stearns	....	2¼″	2″	2¼″
Stearns	....	1¾″	1½″	1¾″
Stearns	2¾″	2¾″	....	....
Sterling	....	....	2¾″	2⅞″
Studebaker	2″	2″	2″	2″
Sun	....	....	2⅜″	2⅜″
Trumbull	1⅜″	1⅜″	1⅜″	1¾″
Velie	2½″	2½″	2½″	2½″
Westcott	2″	2″	2¼″	....
Westcott	2½″	2¼″	2¼″	2¼″
White	2½″	2½″	....	....
White	1⅝″	1⅝″	1¾″	....
White	....	....	2½″	....
White	....	....	....	2¾″
Winton	2¼″	2½″	....	....
Winton	....	3″	3″	3″
Winton	....	....	2½″	2½″

Service Equipment

Time Savers of the Shop

Universal Adjusting and Testing Stand

HERE is a stand which approximates in performance the duties of a burnnig-in and running-in stand for Ford engines, with its application made to electric motors and generators. A panel for the complete testing of the motors and generators is also part of the equipment. A special motor turns the repaired machinery over after the test is made and during the time the faults are being determined. The stand is designed to fit any type and size of motor or generator. A flexible drive through a spring permits connecting these motors and generators to the driving motor, which is capable of a speed of 5000 r.p.m. An ordinary socket wrench supplies the coupling. The panel assemble has mounted on it a voltmeter and an ammeter. Switches, test clips, cords for attachment to terminals of motors and generators, together with angle iron braces and supports, are supplied to secure the panel to a bench or a wall. This stand is particularly well suited to the needs of the service station for winter overhauling work, when a large number of Ford cars are brought to the shop.

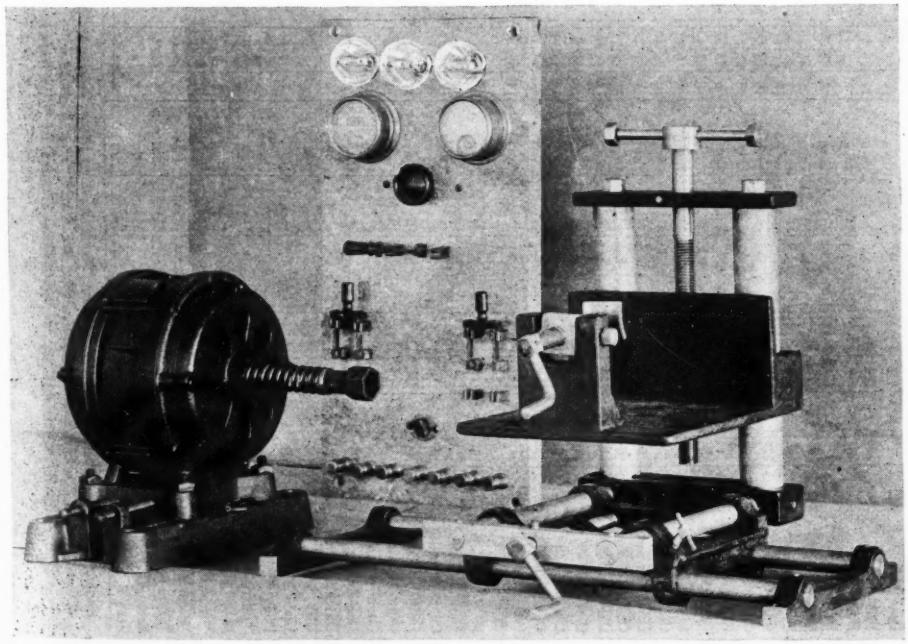
This outfit is made by H. W. Wallin Co., Des Moines, Iowa.



The Boko bucket which eliminates the need of a funnel



The Niehoff Defectometer, a device which enables the electrical expert to locate open circuits



Universal Adjusting and testing stand

The Niehoff Defectometer

The Niehoff Defectometer is a compact and well designed outfit for testing magnetos. It enables the electrical expert to locate open circuits in the coils and winding of the magneto. It permits accurate setting of the contact points by the three point spark tester. A special device permits the repairman to determine whether the condenser is punctured. For its operation, a 6-volt battery is connected across the terminals marked positive and negative. The Defectometer is made by Paul G. Niehoff & Co., Chicago.

Boko Bucket

The Boko bucket is made of water and gasoline-proof fabric, double-sewed and tightly cemented. Its capacity is 2 gal. and the dimensions folded are, 10 in. by ¾ in. Open, it is 10 in. deep. A flexible tube fastens over the top when the bucket is full and also takes the place of a funnel. It is made by the Defiance Welding Co., Defiance, Ohio.

Motor Age Monthly Passenger Car Specification Tables

These prices apply to five and seven-passenger models only—These tables are revised and brought up to date monthly

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. HP.	Carburetor Make and Size	Fuel Feed	Clutch	Gearset	Universals	Rear Axle	Steering Gear	Speedometer	Rims	Battery Volts	Battery Amp	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltages	Name and Model
Allen 43	5	$1395	110	32x4	Miller	3½x5	Own	4	19.6	1—Strom.	Vacuum	B. and B.	Own	Detroit	Columbia	Ditweiler	Stewart	Firestone	6-8	90	Prest.	A-L	A-L	Conn.	6-8	Allen 43.
American B	5	1765	122	32x4	Firestone	3½x5	Ruten.	6	23.44	1—Zen.	Vacuum	B. and B.	G-L	Hart	Salisbury	Gemmer	V. Sicklen	Firestone	6	80	Col.	West.	West.	A-K.	6	American B.
American Beauty	5	2000	121	34x4½	Firestone	3½x4½	Cont.	6	25.35	1½—Ray.	Vacuum	B. and B.	Warner	Acme	Timken	Warner	Warner	Firestone	6	100	Willard	West.	West.	A-K	6	American Beauty.
Anderson 8-20	7	2625	120	33x4	Federal	3½x4½	Cont.	6	25.35	1—Zen.	Vacuum	B. and B.	Durston	Arvac	Col.	Jacox	Stewart	Firestone	6	80	Willard	West.	West.	Conn.	6	Anderson 8-20
Apperson Anniversary.	7	4000	130	34x4½	optional	3½x5	Own	8	33.80	John.	Vacuum	Own	Own	Sterling	Own	Own	V. Sicklen	Firestone	6	90	Willard	Bijur	Bijur	Remy	6	Apperson Anniversary.
Auburn 6-39-H	5	1695	120	33x4	Goodrich	3½x4½	Cont.	6	25.35	1—Ray.	Vacuum	B. and B.	G-L	Hart.	Col.	Jacox	Stewart	Firestone	6	80	Willard	Remy	Remy	Remy	6	Auburn 6-39-H.
Austin 12	6	4250	142	34x4½	Goodrich	2⅞x5	Weid.	12	39.68	1½—Strom.	Vacuum	Muncie	Muncie	Spicer	Austin	Lavine	Warner	Firestone	6	120	Willard	Delco	Delco	Delco	6	Austin 12.
Beggs 6	5	1630	120	.....	Goodrich	3½x4½	Cont.	6	25.35	1 —Strom.	Vacuum	B. and B.	Detroit	Arvac	Timken	Ditweiler	Stewart	Firestone	6	100	Willard	A-L	A-L	Conn	6	Beggs 6
Biddle H	4	2750	121	32x4	Firestone	3⅜x5⅛	Buda	4	22.50	1¼—Zen.	Vacuum	Warner	Warner	Spicer	American	Gemmer	Warner	.....	6	90	Willard	G. & D.	G. & D.	Eise.	6	Biddle H.
*Bour-Davis, 20	5	1700	118	32x4	Goodyear	3½x4½	Cont.	6	25.35	1 —Strom.	Vacuum	B. and B.	Muncie	Mechanics	Salisbury	C. A. S.	Stewart	Perlman	6	115	Willard	Remy	Remy	Remy	6	Bour-Davis, 20*
Brewster	5	6900	125	34x4½	Kelly-S.	4 x5½	Own	4	25.60	Zen.	Vacuum	Own	Own	Own	Own	Own	Stewart	Firestone	....	.....	U. S. L.	U. S. L.	U. S. L.	Bosch	6	Brewster
Briscoe 4-24	5	885	104	30x3½	optional	3⅛x5½	Own	4	16.9	1—Buick	Gravity	Own	Own	Own	Own	Own	Stewart	Perl.-Jack.	6	80	Prest.	A-L.	A-L.	Conn.	6	Briscoe 4-24.
Buick H-45	5	1495	118	33x4	Goodyear	3⅜x4½	Own	6	27.34	Mar.	Vacuum	Own	Own	.....	Own	.....	Stewart	Own	6	60	U. S. L.	Delco	Delco	Delco	.....	Buick H-45.
Buick H-49	7	1785	124	34x4½	Goodyear	3⅜x4½	Own	6	27.34	Mar.	Vacuum	Own	Own	.....	Own	.....	Stewart	Own	6	60	U. S. L.	Delco	Delco	Delco	.....	Buick H-49.
Cadillac 57	7	3520	125	35x5	optional	3½x5⅛	Own	8	31.25	1½—Own	Pressure	Own	Own	Spicer	C-Timk.	Own	V. Sicklen	Kelsey	6	.....	Exide	Delco	Delco	Delco	6-3	Cadillac 57.
Campbell C-4	5	850	110	30x3½	.....	3⅞x4	Own	4	24.03	Sund.	Vacuum	Muncie	.....	Own	Salisbury	Own	V. Sicklen	Firestone	....	.....	Willard	A-L.	Own	A-K.	.....	Campbell C-4.
Case U	7	....	125	35x4½	Goodyear	3½x5¼	Cont.	6	29.40	1¼—Ray.	Vacuum	B. and B.	G-L	Stanweld	Col.	Jacox	Stewart	Stanweld	6	117½	Willard	West.	West.	West.	6	Case U.
Chalmers 35-C	5	1685	117	32x4	optional	3½x4½	Own	6	25.35	1¼—Strom.	Vacuum	Own	Own	U. M. Co.	Timken	Own	Stewart	Kelsey	6	106	Prest.	A-L.	A-L.	Remy.	6	Chalmers 35-C.
Chalmers 35-B	7	1765	122	34x4	optional	3½x4½	Own	6	25.35	1¼—Strom.	Vacuum	Own	Own	U. M. Co.	Timken	Own	Stewart	Kelsey	6	106	Prest.	A-L.	A-L.	Remy.	6	Chalmers 35-B.
Champion, C-6	5	.....	116	33x4	Goodrich	3½x4½	.....	6	23.4	1 —Carter	Vacuum	.....	....	G-L.	.....	Peru	.....	Stewart	.....	....	Willard	Dyneto	Dyneto	Delco	6	Champion, C-4
Champion, C-4	5	.....	116	32x3½	Goodrich	3½x5	Lyco.	4	19.6	1 —Carter	Vacuum	.....	....	G-L.	.....	Peru	.....	Stewart	.....	....	Willard	Dyneto	Dyneto	Delco	6	Champion, C-6
Chandler	7	1795	123	33x4	Goodrich	3½x5	Own	6	29.40	1¼—Ray.	Vacuum	B. and B.	Own	Hartford	Own	Gemmer	Stewart	Firestone	6	120	Prest.	G. & D.	G. & D	Bosch	6	Chandler.
Chevrolet 4-90	5	735	102	30x3½	Goodyear	3⅛x4	Own	4	21.76	1⅛—Zen.	Gravity	Own	Own	Own	Own	Warner	Stewart	Perl-Jack.	6	.....	Prest.	A-L.	A-L.	Will.	6	Chevrolet 490.
Chevrolet F.A. 5 and 2	5	1045	108	32x3½	Goodyear	3⅛x5¼	Own	4	21.76	1⅛—Zen.	Vacuum	Own	Warner	Own	Own	Warner	Stewart	Perl-Jack.	6	.....	Willard	A-L.	A-L.	Will.	6	Chevrolet F.A. 5 and 2
Chevrolet F.B	5	1135	110	33x4	Goodyear	3⅛x5¼	Own	4	21.76	1⅛—Zen.	Vacuum	Own	Warner	Own	Own	Warner	Stewart	Perl-Jack.	6	....	Willard	A-L.	A-L.	Will.	6	Chevrolet F.B
Cleveland 40	5	1385	112	32x4	Goodrich	3 x4½	Own	6	21.6	1 —Strom.	Vacuum	B. and B.	Mechhnics	Mechanics	Own	Ditweiler	V. Sicklen	Firestone	6	94	Prest.	G. & D.	G. & D.	Opt.	6	Cleveland 40
Climber 4-40	5	1465	112	33x4	Goodyear	3¼x5	.....	4	16 90	1 —Strom.	Vacuum	Muncie	Muncie	Hartford	Adams	C. A. S.	V. Sicklen	Jaxon	6	80	Willard	West.	West.	A-K.	6	Climber 4-40
Climber 6-50	7	2395	127	34x5	Goodyear	3½x5¼	Cont.	6	29.40	1¼—Strom.	Vacuum	B. & B.	Muncie	Spicer	Timken	Warner	Stewart	Jaxon	6	100	Willard	West.	West.	Delco	6	Climber 6-50
Cole Aero Eight 870	7	2750	127	33x5	Goodrich	3½x4½	North.	8	39.20	1¼—Strom.	Vacuum	North.	North.	Spicer	Col.	Gemmer	Stewart	Kelsey	6	50	Prest.	Delco	Delco	Delco	6	Cole Aero Eight 870.
*Columbia, C. D. E., C. S. & H.	5	1695	115	32x4	Firestone	3¼x4½	Cont.	6	25.35	1—Strom.	Vacuum	B. and B.	Durston	Spicer	Timken	Gemmer	Stewart	Firestone	6	80	Prest.	A-L.	A-L.	A-K.	6	Columbia C, D, E.* C. S. & H.
*Comet C-53	5	2150	125	33x4	Goodyear	3½x5¼	Cont.	6	29.40	1¼—Strom.	Vacuum	B. and B.	Muncie	Arvac	Ccl.	C. A. S.	Stewart	Firestone	6	75	Willard	Dyn.	Dyn.	Delco	6	Comet C-53.*
Commonwealth 4-40	5	1195	115	32x3½	Goodyear	3½x5	Lyco.	4	19.60	Carter	Vacuum	Mechanics	Mechanics	Mechanics	Peru	Ditweiler	V. Sicklen	Stanweld	6	105	Prest.	Dyn.	Dyn.	A-K.	6	Commonwealth 4-40.
Crow-Elkhart L-55-4	5	1295	117	32x3½	Firestone	3½x5	Lyco.	4	19.60	1—Zen.	Vacuum	B. and B.	Covert	Ther-H.	Peru	Ditweiler	Stewart	Firestone	6	100	Willard	Dyn.	Dyn.	Conn.	6	Crow-Elkhart L 55-4.
Crow-Elkhart H-55-6	5	1545	118	33x4	Firestone	3½x5	Reuten.	6	23.4	1—Zen.	Vacuum	B. and B.	Covert	Ther-H.	Peru	Ditweiler	Stewart	Firestone	6	100	Willard	Dyn.	Dyn.	Conn.	6	Crow-Elkhart H-55-6.
Cunningham V-3	7	.....	132	35x5	optional	3½x5	Own	8	45.00	1½—Strom.	Vacuum	B-L	Own	Spicer	Timken	Gemmer	Warner	Firestone	6	120	Willard	West.	West.	Delco	6	Cunningham V-3.
Daniels B	7	3750	127	34x4½	optional	3¼x5	H-S	8	33.80	1—Zen.	Vacuum	B-L	B-L	Spicer	Timken	Gemmer	Stewart	Firestone	6	100	Willard	West.	West.	.....	6	Daniels B.
Davis 51	5	1765	120	33x4	Goodrich	3¼x4½	Cont.	6	25.35	Strom.	Vacuum	B. and B.	Warner	Arvac	Timken	Warner	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6	Davis 51
Dixie F	5	1365	112	32x4	.....	3¼x5	H-S	4	16.9	1—Strom.	Vacuum	B. and B.	G-L	Ther-H.	Salisbury	C. A. S.	V. Sicklen	Standard	6	80	Willard	Dyn.	Dyn.	Conn.	6	Dixie F.
Dixie Flyer, H-S 50	5	1365	112	.....	Fisk	3¼x5	H-S	4	16.9	1—Strom.	Vacuum	B. and B.	G-L	Ther-H.	Salisbury	C. A. S.	V. Sicklen	Standard	6	80	Willard	Dyn.	Dyn.	Conn.	6	Dixie Flyer, H-S 50
Dodge Brothers	5	1085	114	32x3½	optional	3⅞x4½	Own	4	24.03	1—Stew.	Vacuum	Own	Own	Own	Own	Own	J. Man.	Own	12	50	Willard	N. E.	N. E.	Own	12	Dodge Brothers.
*Dorris 6-80	7	4350	132	35x5	optional	4x5	Own	6	38.40	1½—Strom.	Vacuum	B-L	Own	Spicer	Timken	Warner	V. Sicklen	Firestone	6	115	Willard	West.	West.	Bosch	6	Dorris 6-80*.
Dort 15	5	985	105½	30x3½	Goodyear	3½x5	D-Lyco.	4	19.60	1—Carter	Vacuum	Own	Mechanics	Mechanics	W-Weiss.	Jacox	Stewart	Jakson	6	85	Willard	West.	West.	Conn.	6	Dort 15.
*Elcar 6	5	1595	116	33x4	Firestone	3¼x4½	Cont.	6	25.35	—Strom.	Vacuum	B. and B.	Muncie	Peters	Salisbury	C. A. S.	Stewart	Stanweld	6	90	Willard	Delco	Delco	D.lco	6	Elcar 6*.
*Elcar 4	5	1395	116	33x4	Firestone	3½x5	Lyco.	4	19.60	– Strom.	Vacuum	B. and B.	Muncie	Peters	Salisbury	C. A. S.	Stewart	Stanweld	6	90	Willard	Delco	Delco	Delco	6	Elcar 4*.
*Elgin Series K	5	1485	118	33x4	optional	3½x4¼	Falls	6	23.44	1—Strom.	Vacuum	B. and B.	Mechanics	Mechanics	Ccl.	C. A. S.	V. Sicklen	Firestone	6	90	Willard	Wagner	Wagner	Wagner	6	Elgin Series K *
Essex A	5	1595	108½	32x4	.....	3⅜x5	Own	4	18.23	Own	Vacuum	Own	Own	Spicer	Timken	.....	.....	.....	6	105	.....	Delco	Delco	Delco	6	Essex A.
Ford T	5	525	100	30x3½	.....	3¾x4	Own	4	22.50	H-K	Gravity	Own	Own	Own	Own	Own	.....	.....	6	.....	none	Own	Own	Own	9	Ford T.

Engines—Ruten., Rutenber; Cont., Continental; Weid., Weidely; North., Northway; H-S., Herschell-Spillman; Lyco., Lycoming; D-Lyco., Dort-Lycoming; G. B. & S., Golden, Belknap & Swartz; T-McF., Teetor-McFarlan; ⌘, Monson or Duesenberg; R. & V., Root & Van Dervoort. **Carbureter**—Strom., Stromberg; Zen., Zenith; Ray., Rayfield; John., Johnson; Mar., Marvel; Sund., Sunderman; Stew., Stewart; H-K., Holley-Kingston; Newc., Newcomb; Scheb., Schebler; Tillot., Tillotson; Johns., Johnston. **Generator and Motor**—A-L, Auto-Lite; West., Westinghouse; ⌘, Westinghouse or Auto-Lite; W-L, Ward Leonard; Dyn., Dyneto; N. E., North East; L-N, Leece-Neville; A-C, Allis-Chalmers; Split., Splitdorf; S-N, Simms-Huff; G. & D., Gray & Davis. **Ignition**—A-K, Atwater-Kent; Conn., Connecticut; Eise., Eisemann; West., Westinghouse; Will., Willard; N. E., North East; K-Remy, Kingston-Remy; Berl., Berling; Bosch-W, Bosch-Westinghouse; Split., Splitdorf. **Gearset**—G-L., Grant-Lees; North., Northway; B-L, Brown-Lipe. **Rear Axle**—Col., Columbia; W-Weiss, Walker-Weiss; C-Timk., Cadillac-Timken; West-Mott, Weston-Mott. **Universals**—Hart., Hartford; Ther-H., Thermoid-Hardy; U. M. Co., Universal Machine Co. **Speedometer**—J-Man., Johns-Mansville; V-Sicklen, Van Sicklen. *1920 Model.

Name and Mode	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. HP.	Carbureter Make and Size	Fuel Feed	Clutch	Gearset	Universals	Rear Axle	Steering Gear	Speedometer	Rims	Battery Volts	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltages	Name and Model
Franklin 9-B	5	2650	115	32x4	Goodyear	3¼x4	Own	6	25.35	1—Own	Vacuum	B. and B.	Own	Own	Own	Own	.....	.....	12	50	Willard	Dyn.	.....	A-K.	12	Franklin 9-B
*Gardner		1125	112	32x3½	.....	3½x5	.....	4	19.60	....	.....	B. and B.	.....	Spicer	.....	.....	.....	.....	....	....	.....	.....	.....	West.		Gardner*
Geronimo	5	1550	122	32x4	Goodyear	3½x5	Ruten.	6	23.44	1—Strom.	Vacuum	B. and B.	G-L.	Hart.	W-Weiss	C. A. S.	Stewart	Firestone	6	88	Willard	Dyn.	Dyn.	Delco	6	Geronimo.
Glide 6-40	5	1655	119	34x4	Goodyear	3½x5	Ruten.	6	23.44	1—Ray.	Vacuum	Own	Own	Spicer	American	Ditweiler	Stewart	Goodyear	6	80	Willard	West.	West.	West.	6	Glide 6-40.
*Grant	5	1495	116	32x4	optional	3½x4¼	Own	6	23.44	Strom.	Vacuum	B. and B.	Durston	Spicer	Columbia	Jacox	V. Sicklen	Firestone	6	90	Prest.	Wagner	Wagner	A-K.	6	Grant*.
Hanson	5	1685	119	32x4	optional	3¼x4½	Cont.	6	25.35	Strom.	Vacuum	B. and B.	Covert	Detroit	Timken	Gemmer	Stewart	Kelsey	6	80	Prest.	A-L	A-L	Remy	6-8	Hanson
Harroun	5	995	106	30x3½	.....	3¼x5¼	Own	4	16.90	1—Strom.	Vacuum	Own	Mechanics	Own	Adams	Gemmer	Stewart	Stanweld	6	80	Willard	Remy	Remy	A-K.	6-3	Harroun.
Harvard 4-20	2	850	100	28x3	.....	3x4¼	.....	4	14.40	⅞—Zen.	Gravity	.....	.....	Blood	.....	Barnes	.....	.....	6	.....	National	Wagner	Wagner	A-K.	6-3	Harvard 4-20.
Hatfield A	5	180	115	32x4	Firestone	3¾x4¼	G. B. & S.	4	22.50	1—Zen.	Vacuum	G. B. & S.	G-L	Spicer	Peru	Barnes	.....	.....	6	100	Willard	Dyn.	Dyn.	Conn.	6	Hatfield A.
Haynes 46	7	3250	127	34x4½	optional	2¾x5	Own	12	36.30	1¼—Ray.	Vacuum	B. and B.	Own	Arvac.	Own	Jacox	Warner	Houk	6	125	Willard	L-N.	L-N.	Delco	6	Haynes 46.
Haynes 45	7	2485	127	34x4½	optional	3½x5	Own	6	29.40	1¼—Ray.	Vacuum	B. and B.	Own	Arvac.	Own	Jacox	Stewart	Firestone	6	125	Willard	L-N.	L-N.	Ki-Rem	6	Haynes 45.
Hollier 206	5	1785	116	32x4	Goodyear	3¼x4½	Cont.	6	25.35	1 —Stew.	Vacuum	Own	Own	Own	Own	Gemmer	Stewart	Firestone	6	50	U. S. L.	Apelco	Apelco	Remy	6	Hollier 206.
Holmes	7	2900	126	34x4½	Goodyear	3½x4¼	Own	6	29.40	1 —Newc.	Vacuum	B-L	B-L	Spicer	Timk.	Gemmer	V. S-Elgin	.....	12	100	Col.	Dyn.	Dyn.	Eise.	12-6	Holmes.
Hudson O.	7	2100	125½	34x4½	optional	3½x5	Own	6	29.40	1½—Own	Vacuum	Own	Own	Spicer	Timken	Gemmer	Stewart	Kelsey	6	.....	Exide	Delco	Delco	Delco	6	Hudson O.
Hupmobile R	5	1450	112	32x4	Goodyear	3¼x5½	Own	4	16.90	1 —Strom.	Vacuum	Own	Own	Detroit	Own	Jacox	V. Sicklen	Kelsey	6	87 5	Willard	West.	West.	A-K.	6	Hupmobile R.
Jones	7	2250	126	34x4	Goodrich	3½x5¼	Cont.	6	29.40	1¼—Ray.	Vacuum	B. and B.	G-L	Arvac	Stan-Par	Warner	Stewart	Firestone	6	120	Prest.	West.	A-L.	Remy	6	Jones.
Jordan	7	2775	127	32x4½	Goodyear	3½x5¼	Cont.	6	29.40	1¼—Strom.	Vacuum	B. and B.	Detroit	Sterling	Timken	Gemmer	V. Sicklen	Goodyear	6	109.8	Willard	Delco	Delco	Delco	6	Jordan.
King G	7	2350	120	34x4	Firestone	3x5	Own	8	28.80	1¼—Ball	Vacuum	B. and B.	Own	Spicer	Col.	Jacox	Stewart	Stanweld	6	117.5	Prest.	Bijur	Bijur	A-K.	6	King G.
Kissel	5-7	2750	124	32x4½	Goodyear	3⅞x5½	Own	6	26.30	1¼—Strom.	Vacuum	Warner	Warner	Spicer	Own	Jacox	Stewart	.....	6	90	Willard	Remy	Remy	Remy	6	Kissel.
Kline Kar 6-55 J	5-7	1965	121	33x4	Goodyear	3¼x4½	Cont.	6	25.35	1—Ray.	Vacuum	B. and B.	G-L	.....	Hess	Wohlrab	Stewart	Firestone	6	90	Prest.	Wagner	Wagner	Conn.	6	Kline Kar 6-55 J.
*Leach Power Plus	7	3750	126	32x4½	.....	3½x5¼	Cont.	6	....	....	.....	B.L	B-L	.....	Timken	.....	.....	.....	.....	.....	Hobbs.	.....	.....	Delco	.....	Leach Power Plus*
Lexington R-19	5-7	1785	122	34x4	Goodyear	3¼x4½	Cont.	6	25.35	1—Ray.	Vacuum	B. and B.	Warner	Hardy	Hess	Warner	Stewart	Goodrich	6	100	Willard	West.	West.	Conn.	6	Lexington R-19.
Liberty 10-B	5	1570	115	32x4	Goodyear	3¼x4½	Cont.	6	25.35	1—Strom.	Vacuum	B. and B.	Detroit	Spicer	Timken	Gemmer	Stewart	Firestone	6	88	Willard	Wagner	Wagner	A-K.	6	Liberty 10-B.
Locomobile 48	7	8100	142	35x5	Goodyear	4½x5½	Own	6	48.60	Own	Pressure	Own	Own	Own	Own	Own	Stewart	Firestone	6	150	Exide	West.	West.	Berl.	6	Locomobile 48.
Maibohm B	5	1395	116	32x3½	optional	3½x4¼	Falls	6	23.44	1—Strom.	Vacuum	B. and B.	Mechanics	Mechanics	Peru	Jacox	Stewart	Stanweld	6	94	Willard	Wagner	Wagner	A-K.	6	Maibohm B.
Marmon 34	7	3950	136	32x4½	.....	3¾x5⅛	Own	6	33.75	Strom.	Gravity	Own	Own	Spicer	Own	Gemmer	V. Sicklen	.....	6	120	Prest.	Bijur	Bijur	Bosch	6	Marmon 34.
*Maxwell 25	5	985	109	30x3½	U. S.	3⅝x4½	Own	4	21.03	1—John.	Vacuum	Own	Own	Own	Own	Own	Stewart	Jackson	12	35	Prest.	S-H.	S-H.	A-K.	12	Maxwell 25*.
McFarlan 127	7	4800	136	35x5	optional	4½x6	T-McF.	6	48.60	1½—Strom.	Vacuum	B. and B.	B-L	Spicer	Timken	Gemmer	Stewart	Firestone	6	.....	Willard	West.	West.	Bos..W.	6	McFarlan 127.
Mercer, Series 5	6	4500	132	32x4½	optional	3¾x6¾	Own	4	22.50	1½—Ball	Vacuum	Own	Own	Spicer	Own	Gemmer	Warner	.....	6	120	Willard	West.	West.	Berl.	6	Mercer, Series 5.
Mitchell E-40	5	1690	120	33x4	U. S.	3¼x5	Own	6	29.40	1¼—Ray.	Vacuum	B. and B.	Own	Own	Own	Own	Stewart	Stanweld	6	100	Willard	Remy	Remy	Remy	6	Mitchell E-40.
Mitchell E-42	7	1875	127	34x4½	U. S.	3½x5	Own	6	29.40	1¼—Ray.	Vacuum	B. and B.	Own	Own	Own	Own	Stewart	Stanweld	6	100	Willard	Remy	Remy	Remy	6	Mitchell E-42
Moline-Knight L	5	2000	118	34x4	optional	3¾x5	Own	4	22.50	1¼—Scheb.	Vacuum	B. and B.	Warner	Spicer	Timken	Jacox	Stewart	Firestone	6	117	Willard	Wagner	A-L.	Conn.	6	Moline-Knight L.
Moline-Knight G	7	2500	122	35x4½	optional	4x6	Own	4	25.60	1¼—Scheb.	Vacuum	Own	Warner	Spicer	Timken	Jacox	Stewart	Firestone	6	117	Willard	Wagner	A-L.	Conn.	6	Moline-Knight G.
*Moline-Knight J	7	3000	127	32x4½	Optional	3½x4½	Own	6	29.40	1¼—Scheb.	Vacuum	B. and B.	B L	Spicer	Timken	Jacox	Stewart	Firestone	6	117	Willard	W er	Wagner	Wagner	6	Moline-Knight J*.
*Moline-Knight R	5	2100	116	32x4	Optional	3¾x5	Own	4	22.50	1¼—Scheb.	Vacuum	B. and B.	B-L	Spicer	Salisbury	Jacox	Stewart	Firestone	6	117	Willard	W er	Wagner	Wagner	6	Moline-Knight R*.
Monitor, M. & O	5	1575	117	33x4	Miller	3¼x4½	Cont.	6	25.35	1 —Strom.	Vacuum	B. and B.	G-L	.. ..	Stanweld	C. A. S.	Stewart	Stanweld	6	110	Prest.	Dyn.	Dyn.	Conn.	6	Monitor, M. & O.
Moon Victory	5	1885	118	32x4	Miller	3¼x4½	Cont.	6	25.35	1—Tillot.	Gravity	B. and B.	B-L	Spicer	Timken	Warner	V. Sicklen	Stanweld	6	100	Exide	Delco	Delco	Delco	6	Moon Victory.
Moon 6-66	7	2750	125	35x4½	Miller	3½x5¼	Cont.	6	29.40	1½—Ray.	Vacuum	B. and B.	Warner	Arvac	Timken	Warner	V. Sicklen	Firestone	6	110	Exide	Delco	Delco	Delco	6	Moon 6-66
Moore 30	5	1095	106	30x3½	Firestone	3¾x4¼	G. B. & S.	4	22.50	1—Mar.	Vacuum	Detroit	G-L	U. P.	Peru	Ditweiler	Stewart	Parker	6	80	Willard	A-L.	A-L.	Conn.	6	Moore 30.
Nash Six	5	1490	121	35x4	Firestoue	3½x5	Own	6	25.35	1¼—Mar.	Vacuum	B. and B.	Own	Own	Own	Gemmer	Stewart	Firestone	6	100	Willard	Wagner	Wagner	Wagner	6	Nash Six
Nash Six	7	1640	127	34x4½	Firestone	3¼x5	Own	6	25.35	1¼—Mar.	Vacuum	B. and B.	Own	Own	Own	Gemmer	Stewart	Firestone	6	100	Willard	Delco	Delco	Delco	6	Nash Six
*National Sextet	6	3290	130	32x4½	optional	3½x5¼	Own	6	29.40	1½—Ray.	Vacuum	B. and B	B-L	Arvac	Col.	Warner	Warner	Firestone	6	110	Prest.	West.	West.	Delco	6	National Sextet*
Nelson	5	1500	104	32x4	Goodyear	3½x4¾	Own	4	15.63	1 —Zenith	Vacuum	Own	Own	Own	Own	Own	Stewart	Kelsey	12	72	Willard	U. S. L.	U. S. L.	Bosch	12	Nelson.
Oakland 34-B	5	1075	112	32x4	Goodyear	2½x4¾	Own	6	18.99	1—Mar.	Vacuum	North.	Warner	Mechanics	West-Mott	Jacox	Stewart	Perlman	6	85	Prest.	Remy	Remy	Remy	6	Oakland 34-B.
*Oldsmobile 37-A	5	1395	112	32x4	Goodyear	2½x4¾	North	6	18.99	1¼—John.	Vacuum	North.	Warner	.....	West-Mott	Jacox	Stewart	Perlman	6	80	Willard	Remy	Remy	Remy	6	Oldsmobile 37-A*.
*Oldsmobile 45-B	7	1875	120	34x4½	Goodyear	2⅞x4¾	Own	8	26.45	1¼—Ball	Vacuum	Own	North.	Hartford	West-Mott	Jacox	Stewart	Perlman	6	100	Exide	Delco	Delco	Delco	6	Oldsmobile 45-B*.
Olympian 45	5	1240	112	32x3½	Miller	3¼x4½	Own	4	16.90	1¼—Strom.	Vacuum	B. and B.	Own	.....	Peru	Warner	Stewart	Perlman	6	....	U. S .L.	A-L.	A-L.	Conn.	6	Olympian 45.
Overland 90	5	985	106	31x4	.....	3½x5	Own	4	18.23	1—Tillct.	Vacuum	Own	Own	Own	Own	Own	Stewart	Stanweld	6	80	U. S. L.	A-L.	A-L.	Conn.	6	Overland 90.
*Overland 4	5	845	100	....	.....	3¼x4	.....	...	....	¾—Tillot	.....	.....	.....	.....	.....	.....	.....	.....	6	....	.....	.....	.....	A-L	....	Overland-4*

Engines—Ruten., Rutenber; Cont., Continental; Weid., Weidely; North., Northway; H-S., Herschell-Spillman; Lyco., Lycoming; D-Lyco., Dort-Lycoming; G. B. & S., Golden, Belknap & Swartz; T-McF., Teetor-McFarlan; #, Monson or Duesenberg; R. & V., Root & Van Dervoort. **Carbureter**—Strom., Stromberg; Zen., Zenith; Ray., Rayfield; John., Johnson; Mar., Marvel; Sund., Sunderman; Stew., Stewart; H-K., Holley-Kingston; Newc., Newcomb; Scheb., Schebler; Tillot., Tillotson; Johns., Johnston. **Generator and Motor**—A-L, Auto-Lite; West., Westinghouse; #, Westinghouse or Auto-Lite; W-L, Ward Leonard; Dyn., Dyneto; N. E., North East; L-N, Leece-Neville; A-C, Allis-Chalmers; Split., Splitdorf; S-N. Simms-Huff; G. & D., Gray & Davis. **Ignition**—A-K, Atwater-Kent; Conn., Connecticut; Eise., Eisemann; West., Westinghouse; Will., Willard; N. E., North East; K-Remy, Kingston-Remy; Berl., Berling; Bosch-W, Bosch-Westinghouse; Split., Splitdorf. **Gearset**—G-L. Grant-Lees; North., Northway; B-L, Brown-Lipe. **Rear Axle**—Col., Columbia; W-Weiss, Walker-Weiss; C-Timk., Cadillac-Timken; West-Mott, Weston-Mott. **Universals**—Hart., Hartford; Ther-H., Thermoid-Hardy; U. M. Co., Universal Machine Co. **Speedometer**—J-Man., Johns-Mansville; V-Sicklen, Van Sicklen. *1920 Model

Motor Age Monthly Passenger Car Specification Tables—Concluded

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N.A.C.C. HP.	Carbureter Make and Size	Fuel Feed	Clutch	Gearset	Universals	Rear Axle	Steering Gear	Speedometer	Rims	Battery Volts	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltages	Name and Model
Owen Magnetic O-36	7	4200	....	35x5	.....	3¾x5½	Buda	6	25.35	Zen.	Vacuum	Own	Own	.....	Amer.	Own	.....	.....	.....	.....	Willard	Own	Own	Bosch	24	Owen Magnetic O-36.
Owen-Magnetic, W-42	7	5500	142	35x5	Optional	4 x5½	Weid.	6	38.40	Zen.	Vacuum	Own	Own	Spicer	Amer.	Own	Warner	.....	24	.....	Willard	Own	Own	Bosch	28	Owen-Magnetic, W-42.
Packard 3-25	7	5200	128	35x5	Goodyear	3x5	Own	12	43.20	Own	Pressure	Own	Own	Spicer	Own	Own	Waltham	Firestone	6	120	Willard	Bijur	Bijur	Delco	7	Packard 3-25.
Packard 3-35	7	5550	136	35x5	Goodyear	3x5	Own	12	43.20	Own	Pressure	Own	Own	Spicer	Own	Own	Waltham	Firestone	6	120	Willard	Bijur	Bijur	Delco	7	Packard 3-35.
Paige 6-55	7	2060	127	34x4½	optional	3½x5¼	Cont.	6	29.40	1¼—Ray.	Vacuum	B. and B.	Own	Spicer	Salisbury	Jacox	Stewart	Kelsey	6	108	Willard	Remy	Remy	Remy	6	Paige 6-55.
Paige 6-39	5	1555	117	33x4	optional	3½x5	Ruten.	6	23.44	1 —Strom.	Gravity	B. and B.	Own	Own	Salisbury	Jacox	Stewart	Cleveland	6	108.4	Willard	G. & D.	G. & D.	Remy	6	Paige 6-39.
Paterson 6-46	7	1725	120	33x4	optional	3¼x4½	Cont.	6	25.35	1½—Strom.	Vacuum	B. and B.	Durston	Hartford	Hess	Jacox	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6	Paterson 6-46.
Peerless Series 4	7	2900	125	34x4½	Goodyear	3¼x5	Own	8	33.80	Ball	Vacuum	Own	Own	Spicer	Timken	.....	Stewart	Stanweld	12	125	Willard	A-L.	A-L.	A-K.	6	Peerless, Series 4.
Phianna R	...	5000	125	32x4½	U. S.	3⅜x6	Own	4	24.70	1½—H. & N.	Vacuum	Own	Own	Own	Amer.	Own	Warner	Firestone	6	.....	Willard	W-L.	W-L.	Bosch	6	Phianna R
Piedmont	5	1235	114	32x3½	.....	3½x5¼	Own	4	19.60	Carter	.....	.....	.....	.....	.....	.....	.....	Firestone	6	.....	Willard	.....	.....	.....	.....	Piedmont.
Piedmont 6-40	...	1685	120	32x4	.....	3¼x4½	Cont.	6	25.35	Zen.	.....	B. and B.	.....	.....	Timken	.....	.....	Firestone	6	.....	Willard	Remy	Remy	Remy	.....	Piedmont 6-40.
Pierce-Arrow 38	7	7250	134	34x4½	Goodrich	4 x5½	Own	6	38.4	Own	Pressure	Own	Own	Own	Own	Own	Waltham	Goodrich	6-8	135	.....	West	West.	Delco	6	Pierce-Arrow 38.
Pierce-Arrow 48	7	7750	142	35x5	Goodrich	4½x5½	Own	6	48.60	Own	Pressure	Own	Own	Own	Own	Own	Waltham	Goodrich	6-8	135	.....	West.	West.	Delco	6	Pierce-Arrow 48.
Pilot 6-45	5	1650	120	32x4	Miller	3½x5	Teetor	6	23.44	1¼—Tillot.	Vacuum	B. and B.	Muncie	Hart.	Spacke	Ditweiler	Stewart	Standard	6	.....	Prest.	Delco	Delco	Delco	6	Pilot 6-45.
*Premier 6-D	7	4300	126¾	32x4½	Firestone	3⅜x5½	Own	6	27.34	1¼—Johns.	Vacuum	B. and B.	Own	Peters	Stan-Par.	Warner	Warner	Firestone	6	123.5	Willard	Delco	Delco	Delco	6	Premier 6-D*.
Reo T & U	5	1650	120	33x4	U. S.	3⅛x5	Own	6	24.3	1—Ray.	Vacuum	Own	Own	Own	Own	Own	Stewart	Firestone	6	108.5	Willard	N. E.	N. E.	N. E.	6	Reo T.
Revere	7	4250	131	32x4½	optional	4⅜x6	# & Own	4	30.63	1¾—Strom.	Vacuum	B-L	B-L,	Spicer	Tim.-Ball	Gemmer	Stewart	Houk	6	120	Willard	West.	West.	Bosch	6	Revere.
Roamer 6-54	7	.....	128	32x4½	Goodyear	3½x5¼	Cont.	6	29.40	1¼—Strom.	Vacuum	B. and B.	G-L	Arvac	Hess	Jacox	Warner	Hayes	6	115	Col.	Bijur	Bijur	Bosch	6	Roamer 6-54.
Saxon Y-18	5	1195	112	32x3½	Goodyear	2⅞x4½	Cont.	6	19.84	1—Strom.	Vacuum	Own	Own	Spicer	Timken	Warner	Stewart	Firestone	6	60	Prest.	Wagner	Wagner	Remy	6	Saxon Y-18.
Sayers Six	5	1745	118	32x4	Goodyear	3¼x4½	Cont.	6	25.35	1—Zen.	Vacuum	B. and B.	G-L	Arvac	Stan-Par.	Warner	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6	Sayers Six
Scripps-Booth 6-39	5	1295	112	32x4	Goodyear	2⅛x4¾	North.	6	18 99	1—Mar.	Vacuum	North.	Warner	Mechanics	West-Mott	J. C. W.	Stewart	Perlman	6	85	Prest.	Remy	Remy	Remy	6	Scripps-Booth 6-39.
Seneca H, H-2	5	1085	108	30x3½	Miller	3½x4½	LeRoi	4	15.63	1—Scheb.	Vacuum	Detroit	Detroit	U. M. Co.	Adams	Ditweiler	Stewart	Jackson	6	88	Prest.	A-C.	A. C.	Conn.	6	Seneca H, H-2.
Singer, 19	7	5250	139	35x5	Goodyear	4 x5½	H-S	6	38 40	1¾—Ray	Vacuum	Muncie	Muncie	Spicer	Timken	Gemmer	Stewart	Own	6	.....	Willard	West.	West.	.....	6	Singer, 19
Standard H	7	2750	127	34x4½	Firestone	3¼x5	H-S	8	33.80	1¼—Zen.	Vacuum	B. and B.	G-L	Spicer	Timken	Gemmer	Stewart	Firestone	6	162	Willard	West.	West.	Split.	6	Standard H.
Stearns SKL-4	5	2350	125	34x4½	Goodyear	3¾x5⅝	Own	4	22.50	1¼—Scheb.	Vacuum	Own	Own	Spicer	Own	Own	V. Sicklen	Firestone	12	65	Willard	West.	West.	A-K.	12	Stearns SKL-4.
Stephens 86	6	2050	122	33x4½	Fisk	3¼x4½	Own	6	25.35	1¼—Till.	Vacuum	B. and B.	Mechanics	Mechanics	Stan-Par	C. A. S.	Stewart	Stanweld	6-8	116	U. S. L.	A-L	A-L	Conn.	6	Stephens 86.
*Studebaker EG	7	2135	126	33x4½	Goodyear	3⅞x5	Own	6	36.04	1½—Ball	Vacuum	Own	Own	Spicer	Own	Own	V. Sicklen	Kelsey	6	80	Willard	Wagner	Wagner	Wagner	7	Studebaker EG.*
*Studebaker EH	5	1685	119	32x4	.....	3½x5	Own	6	29.40	1½—Strom.	Vacuum	Own	Own	Spicer	Own	Own	V. Sicklen	Kelsey	6	80	Willard	Wagner	Wagner	Wagner	6	Studebaker EH.*
Stutz G	6-7	2850	130	32x4½	.....	4⅜x6	Own	4	30.63	Strom.	Pressure	Own	Own	Own	Own	Gemmer	Warner	.....	12	.....	Willard	Remy	Remy	.....	.....	Stutz G.
Templar 445	5	2485	118	32x4	Templar	3¾x5½	Own	4	18.23	1¼—Strom.	Vacuum	B. and B.	Detroit	Hardy	American	Jacox	Warner	Parker	6	100	Col.	Bijur	Bijur	Simms	6	Templar 445.
Tulsa, D	5	1335	117½	33x4	Firestone	5 x3½	Lyco.	4	19 60	1 —Miller	Vacuum	B. and B.	G-L	Detroit	Salisbury	C. A. S.	Stewart	Stanweld	6	90	Exide	Dyn.	Dyn.	Conn.	6	Tulsa, D.
*Velie 48	5	1685	115	32x4	Goodyear	3¼x4½	Cont.	6	25.35	1¼—Ray.	Vacuum	B. and B.	Durston	Arvac	Timken	Gemmer	V. Sicklen	Firestone	6	120	Willard	Bijur	Bijur	Bijur	6	Velie 48.*
Westcott B-38	5	2090	118	33x4	Firestone	3¼x4½	Cont.	6	25.35	1 —Ray	Vacuum	B. and B.	Warner	Spicer	Timken	Gemmer	V. Sicklen	Firestone	6	120	Willard	Delco	Delco	Delco	6	Westcott B-38.
Westcott A-48	7	2590	125	32x4½	Firestone	3½x5¼	Cont.	6	29.40	1¼—Ray.	Vacuum	B. and B.	B-L.	Spicer	Timken	Gemmer	V. Sicklen	Firestone	6	120	Willard	Delco	Delco	Delco	6	Westcott A-48.
Willys-Knight 88-4	7	1725	121	34x4½	.....	4½x4½	Own	4	27.23	1¼—Tillot.	Vacuum	Own	Own	Own	Own	Warner	Stanweld	6	120	U. S. L.	A-L.	A-L.	Conn.	6	Willys-Knight 88-4.
Winton 24	7	4350	138	35x5	optional	4½x5½	Own	6	48.60	1¾—Strom.	Vacuum	.....	.....	.....	.....	.....	Warner	Firestone	6	139	Willard	Bijur	Bijur	Bosch	6	Winton 24.
*Winton 25	7	3800	132	35x5	optional	3¾x5¼	Own	6	33.75	1¼—Strom.	Vacuum	.....	.....	.....	.....	.....	Warner	Firestone	6	120	Willard	Bijur	Bijur	Bosch	6	Winton 25*.

STEAM CARS

Stanley 735	7	3450	130	35x4½	optional	4x5	Own	2	.....	none	none	none	none	none	Own	Warner	Warner	Firestone	6	.....	Willard	Remy	none	none	6	Stanley 735.

Engines—Ruten., Rutenber; Cont., Continental; Weid., Weidely; North., Northway; H-S., Herschell-Spillman; Lyco., Lycoming; D-Lyco., Dort-Lycoming; G. B. & S., Golden, Belknap & Swartz; T-McF., Teetor-McFarlan; #, Monson or Duesenberg; R. & V., Root & Van Dervoort. **Carbureter**—Strom., Stromberg; Zen., Zenith; Ray., Rayfield; John., Johnson; Mar., Marvel; Sund., Sunderman; Stew., Stewart; H-K., Holley-Kingston; Newc., Newcomb; Scheb., Schebler; Tillot., Tillotson; Johns., Johnston. **Generator and Motor**—A-L, Auto-Lite; West., Westinghouse; #, Westinghouse or Auto-Lite; W-L, Ward Leonard; Dyn., Dyneto; N. E., North East; L-N, Leece-Neville; A-C, Allis-Chalmers; Split., Splitdorf; S-N, Simms-Huff; G. & D., Gray & Davis. **Ignition**—A-K, Atwater-Kent; Conn., Connecticut; Eise., Eisemann; West., Westinghouse; Will., Willard; N. E., North East; K-Remy, Kingston-Remy; Berl., Berling; Bosch-W, Bosch-Westinghouse; Split., Splitdorf. **Gearset**—G-L., Grant-Lees; North., Northway; B-L, Brown-Lipe. **Rear Axle**—Col., Columbia; W-Weiss, Walker-Weiss; C-Timk., Cadillac-Timken; West-Mott, Weston-Mott. **Universals**—Hart., Hartford; Ther-H., Thermoid-Hardy; U. M. Co., Universal Machine Co. **Speedometer**—J-Man., Johns-Manville; V-Sicklen, Van Sicklen. *1920 Model.

Among the Makers and Dealers

Short Trade Notes

Harvey Truck Prices Advanced—The Harvey Motor Truck Co. has announced an increase in prices of 2½- ton models to $3,300 and the 3½-ton models to $4,300. Prices on other models are unchanged.

Brede Heads Hinkley Service—The Hinkley Motors Corp. announces the appointment of O. M. Brede as service manager. Brede before entering the air service was connected with the Detroit Section, Society of Automotive Engineers, and since his discharge has been with Continental Motors Corp.

Duplex Truck Declares Dividend—A 10 per cent cash dividend has been declared by the directors of the Duplex Truck Co., payable Nov. 15. The company's books show it free of all indebtedness and with a substantial reserve. The concern was formed in 1916 by Lansing capitalists and took over the business of the Duplex Co. of Charlotte.

Body Builders Buy Chair Company—Everett Bros., automobile body builders, have purchased the factory and real estate of the Murphy Chair Co., the transaction involving approximately $1,500,000. The factory contains about 550,000 feet of floor space and covers 12 acres. The present business of Everett Bros., now housed in five plants, will be centralized in the new factory and the output greatly increased.

Canadian Olds Ready Jan. 1—The Olds Motor Works, Ltd., of Canada, a new General Motors unit established at Oshawa, near Toronto, will have its new plant ready for operation Jan. 1. All models of Oldsmobiles and trucks will be produced and the output will be restricted to the Canadian field. The factory building, 80 by 100 ft., consists of three stories and a basement and has 100,000 feet of floor space. General Motors has appropriated $450,000 for the construction and equipment of the new unit and the first year's schedule calls for 5,000 jobs of all models. All basic requirements of the new unit will be furnished from the local plant.

Lines Heads Gordon Tire Sales—M. S. Lines, who for the last two years has been special sales representative for the company in the eastern states, has been appointed to the sales management for the Gordon Tire & Rubber Co., Canton, Ohio.

Apex Doubles Factory Space—The Hamilton Motors Co., manufacturer of Apex trucks, has purchased ground which will enable it to double its present output of trucks. The Hamilton company has purchased ground adjoining its present factory at Grand Haven, Mich., for the new buildings.

Anthony New Packard Manager—Walter Y. Anthony, for several years prominent in the Packard Motor Car Co. of Philadelphia and assistant general manager there since 1916, has been promoted to the general managership of the branch to succeed Lee J. Eastman, recently elected president and general manager of the New York company. Mr. Anthony has been with the Packard company since 1909.

Hayes Wheel Co. May Merge—The Hayes Wheel Co. of Jackson, Mich., is considering a proposal for a merger of that company with the Prudden Wheel Co., the Auto Wheel Co., the Gier Pressed Steel Co. of Lansing, the Hayes Motor Truck Wheel Co. of St. John, the Imperial Wheel Co. of Flint, the Pioneer Pole and Shaft Co. and the Weiss and Loesch Co. of Piqua, Ohio. The proposed consolidation contemplates a capitalization of $20,000,000 with headquarters of the new company at Jackson. The Hayes Wheel Co. is the largest of the interests involved, with a daily output of 5,000 sets of wheels and a business of $20,000,000 a year, and is the only company manufacturing steel and wire wheels. The Pioneer Pole and Shaft Co., manufactures rims and spokes, the Ohio companies in the proposed merger being the largest spoke manufacturers in the country.

Ross Heads Templeton, Kenly & Co.—H. W. Ross has been elected vice-president of Templeton, Kenly & Co., Chicago, makers of the Simplex jack.

Open Electric Service Station—J. R. Bailey and N. C. Heller have opened a new service station for starting, lighting and ignition repairs in South Chicago, Ill. Both have had considerable experience in electrical repair work.

Firestone Builds New Rim Factory—Ground has been broken at Akron, Ohio, for the addition of a $1,000,000 plant for the Firestone Steel Products Co. The Firestone company produces steel bases used for solid truck tires and demountable rims for passenger car pneumatic tires.

Lansdale to Join E. S. Hare—Henry Lansdale, former passenger car sales manager for the Packard Motor Car Co., has resigned and will join Emlen S. Hare in the Mercer Motors Co. in New York. Hare formerly was vice-president of the Packard and becomes president of the new organization formed by New York bankers to take over the Mercer Automobile Co.

Carlson Goes to Denmark for Ford—George Carlson traffic expert at the Portland branch of the Ford Motor Co., has been promoted to be assistant manager of the new Ford assembly plant at Copenhagen, Denmark. This plant will distribute Ford cars in Denmark, Sweden, Norway and Western Russia. Carlson's proficiency in the Danish and Swedish language was one factor in his selection.



Westcott Ships Bodies by Truck—This is how the Westcott Motor Car Co., Springfield, Ohio, is getting around transportation difficulties. By this method twenty-one of the lighter six touring bodies can be hauled at one load, or equal to the number that can possibly be loaded into a 40-ft. railroad car. The Westcott body factory is at Muncie, Ind., a distance of approximately 100 miles from the main plant. The round-trip is made by truck in 20 hours, including loading and unloading time with an average of 15 m.p.h. on the road. Under normal conditions the average shipping time from Muncie to the Westcott factory is one week. Under present conditions delivery is practically impossible. While the expense of shipping by truck is somewhat greater, the Westcott company is using this precaution against any tie-up in production. The special racks for carrying the bodies were built in the Westcott factory and provision is made to bolt down each body securely to prevent damage. Large canvas envelopes fit down close over the bodies on both the truck and trailer, protecting them against the weather.

From the Four Winds

Glimpses at the World of Motordom

Picks "Best Ohio Road" — "The 'best road in Ohio' is in two stretches of 3½ miles each, one south of Middletown and one north, beginning at the edge of that city," says W. T. Calerdine, Chairman of the Highways Committee of the Cincinnati Chamber of Commerce, in a report on a recent inspection tour of southern Ohio roads under reconstruction by the State Highway Department. The committee learned that only a short stretch of road remains to be completed between Franklin and Miamisburg, Ohio, to make a good solid highway between Cincinnati and Dayton. This stretch, it is expected, will be finished by December 1.

Ohio Hopes to Get Roads Bonds—The Ohio Good Roads Federation has taken up the work of having special road levies approved by the voters of 66 counties in the state at the usual fall election in November. The Federation has adopted the plan of the Liberty Loan campaigns by having a large number of four-minute men make talks in the counties where the bond issues are up for approval. The proposed levies vary from a half mill to two mills of the duplicate and run from one to ten years. It is believed that 55 of the counties will approve the special levies.

St. Louis Gains in Licenses—Motor car licenses issued by the city of St. Louis for the first nine months of the year are greater by 7271 than the total number licensed for all of 1918, according to tre report of City License Collector Chapman. In 1918, the licenses issued numbered 28,474, of which 977 were for service cars. So far this year, 35,845 licenses have been issued, of which 1218 have been service cars. Licenses are being issued at the rate of about 40 a day. The city's revenue from motor car licenses in 1918 was $101,859.29. So far this year it is $127,879.50.

Ohio Leads in Motor Licenses—With more than 70 days left, the Ohio Automobile department has broken all records of the state and in fact any state in the Union in the number of licenses issued for 1919. Up to Oct. 20 the department issued licenses for 503,500 passenger cars and commercial vehicles, operated by gasoline. The department had also issued licenses for 5000 electrics and to dealers and manufacturers to the number of 3600. Thus it is seen that the number of motor vehicles being operated in the Buckeye State is in excess of 510,000. The department has ordered the manufacture of license plates for gasoline cars up to 505,000, which is allowing for 2000 additional cars to be registered in that class. The department licensed motorcycles to the number of 20,200.

To Draft Ohio Anti-Theft Law—Judge Harvey C. Smith, secretary of State of Ohio has been selected by automobile interests as well as lawmakers to draft an automobile theft law for the state. Preparation of such a law was considered at a conference of secretaries of state which was held at Washington, D. C., recently. It is proposed to make it a felony to deface any automobile number and persons having stolen cars in their possession will be amenable to the law. It is proposed to make the law drastic in many regards in order to stop, if possible, the many thefts of cars.

Detroit Limits Truck Speeds—Strict enforcement of the ordinance limiting trucks to a speed of ten miles an hour, is ordered by Police Commissioner Inches of Detroit as the result of 192 fatalities during the past 12 months, many of which were caused by trucks. The Detroit Traffic Association has asked all of its members to instruct drivers accordingly in order to prevent further adverse legislation.

Curtiss Employes Get Flights—Working on the theory that any one who has ridden in an airplane will do better work in the manufacturing end of the flying game the Curtiss Aeroplane and Motors Corp. is giving foremen and other workers employed in its Buffalo plants rides in machines they have helped build. As many as a dozen employes are being given their first airplane rides on good flying days at Curtiss field, adjoining the Niagara Falls boulevard. Skilled pilots who are in charge of the machines do not hesitate to give their passengers real thrills by attempting tail spins, nose dives and other stunts which are awe inspiring even from the ground.

Kansas City Limits Jitneys—Jitney drivers in Kansas City were reduced in number from more than 1200 to about 500 on Oct. 22, when an ordinance regulating jitney traffic went into effect. The ordinance requires a $2,500 bond, which will be increased to $5,000 within a year. The routing of jitneys is designated by an inspector. The jitneys must cover the entire route designated, and comply with minor rules to hold their licenses.

Prohibit Signs on Highway—Unsightly advertising signs will no longer desecrate the right of way of the main highways of the Inland Empire. Permission has been granted the Inland Automobile association to remove all signs within 30 feet of the center of the road, and work of beautifying the roadways began on Nov. 1.

"We have received permission from the county commissioners to remove unsightly tin, wooden and painted signs before Nov. 1," says Frank Guilbert, secretary of the association. "The association will be divided into cleanup groups, and before the first of the year all signs on the right of way will be moved. In some cases where the signs are permanently painted on rocks and trees, chemicals may have to be used to restore the substance to its natural state."

Spokane to Regulate Traffic—Radical remedial changes in Spokane traffic regulations, following out the nation-wide improvement in traffic conditions, which include the demand that every automobile operating on Spokane streets be equipped with a speedometer, elimination of the abused privilege of parking automobiles in the congested downtown business district and the clearing of cars from certain busy thoroughfares have been proposed to the city council by heads of the Spokane Automobile Chamber of Commerce. Conditions have reached such a stage because of the increasing number of automobiles that the congestion on downtown streets is alarming, according to auto dealers. The Seattle ordinance has been submitted as a model for adoption.

Coming Motor Events

DEMONSTRATIONS

Houston, Tex.	Rice Tractor Exhibition	Nov. 11-13

RACES

Los Angeles, Cal.	Ascot Speedway	Nov. 27
Los Angeles, Cal.	Ascot Speedway	Dec. 20
El Paso Tex.	El Paso-Phoenix Road Case	November

SHOWS

Boston	Boston Automobile Show	March 13-20
Chicago	Aeronautic Show	Jan. 8-14
Chicago	Automotive Equipment Association	Nov. 3-8
New York	N. A. C. C.	Jan. 3-10
Chicago	N. A. C. C.	Jan. 24-31
Kansas City, Mo.	Kansas City Tractor Club	Feb. 9-14
Wichita, Kan.	Wichita Thresher-Tractor Club	Feb. 9-11
Toledo, Ohio	Motor Show	January
New Orleans	Fashion Show	March
Kansas City	Tractor Show	Feb. 9-16
Brussels, Belgium	Motor Car Show	Jan. 10-18
Detroit	N. A. C. C. Service Meetings	Nov. 10-11-12
Montreal, Que.	Dealers' Show	February
Spokane, Wash.	Automobile Show	Jan. 21-25
Paris, France	Aeronautic Industries Show	Dec. 19-Jan. 4
Cleveland, Ohio	Automobile Show	Jan. 17-24
Buffalo, N. Y.	Automobile Show	March 1-8

CONVENTION

Detroit	National Service Men	Nov. 10

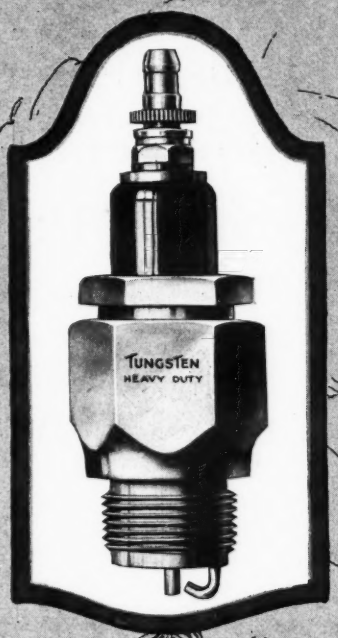
TUNGSTEN

TRADE MARK REGISTERED

SPARK PLUG

Always on the job

FOR THOSE WHO DEMAND THE BEST



The Tungsten Heavy Duty type is meeting the demand of that large class of motorists who realize the satisfaction and ultimate saving in buying the best.

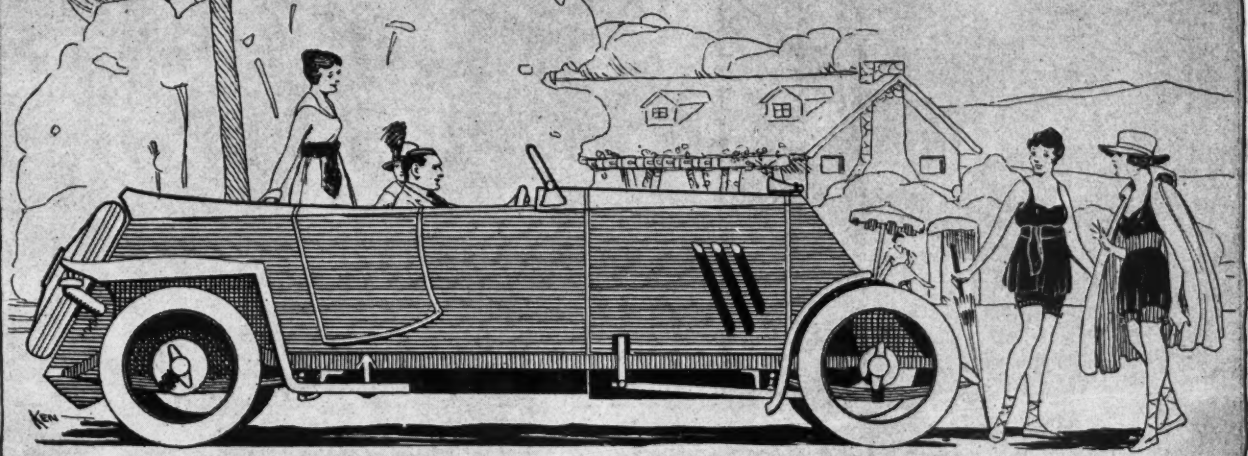
Its big sturdy blue insulator, its heavy one-piece monel central stem, together with its simplicity of design assure maximum service under the most extreme conditions in high compression high speed motors, in big tractor engines and in large stationary gas engines.

For those who always want the best and to meet those conditions where nothing but the best will do.

The Tungsten sales policy assures you a good profit and a square deal.

A card or letter will bring you further details.

Tungsten Manufacturing Company
Marshalltown, Iowa





GOBLIN SOAP is the great solvent of grease and grime: it cleans thoroughly by dissolving the dirt and not by scraping or cutting it off the hands and face.

The result is that the skin is left in a soft and healthy condition.

If you have tried other soaps for obstinate grease and dirt you'll be delighted with the quick yet gentle action of Goblin Soap.

Keep a cake handy—it meets every need.

If your dealer does not have Goblin Soap, send us his name and we will see that you are promptly supplied

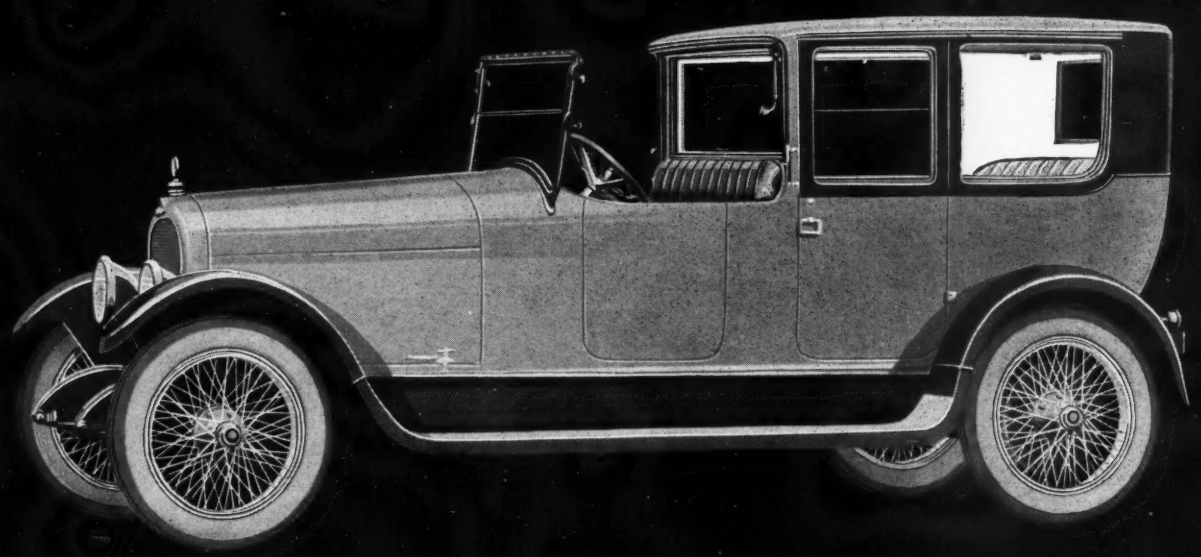
CUDAHY, 111 West Monroe Street, Chicago
64 MACAULEY AVENUE TORONTO, CANADA

Goblin Soap
WORKS WONDERS

MARMON 34

A light, strong chassis; a powerful, silent engine, a low luxurious body — the whole perfectly balanced — achieving a motor car that combines the exceptional in performance with the exceptional in economy.

NORDYKE & MARMON COMPANY
Established 1851
INDIANAPOLIS



HERE is what a bank president says of his Marmon. His impression is typical of the enthusiasm of Marmon owners.

"Before buying a new car I looked over the entire list carefully and tried everything that looked hopeful. I now have driven the Marmon about six weeks and my experience has been a chapter from the 'Arabian Nights,' where the hero sails away on his winged horse and after a series of delightful adventures returns safely and happily. I am no mechanic, but the mechanism of the car seems to be perfect—anyway you could not sell me any car but the Marmon regardless of price."

The Marmon dealer enjoys a decided advantage in representing a car that is so highly acclaimed by its owners.

NORDYKE & MARMON COMPANY
Established 1851
INDIANAPOLIS

MARMON 34

TRIONE

Trade Mark Reg. U. S. Pat. Off.



The Three-Piece Snap Piston Ring

In heavy structures — and in TRIONE Piston Rings — strength is obtained by the angle beam.

And science demands in a piston ring results that can be obtained only by three-piece construction. The TRIONE angle beam inner ring gives the three-piece ring the strength that makes it practical.

The TRIONE is three snap rings in one. Snap ring simplicity; with effectiveness tripled.

SALES DEPARTMENT

BAILEY-DRAKE CO., Inc.

1120 South Michigan Ave.

CHICAGO, ILLINOIS

BRANCHES:

New York	N. Y.
Detroit	Mich.
Dallas	Texas
Atlanta	Ga.
San Francisco	Cal.
Kansas City	Mo.
Minneapolis	Minn.
Seattle	Wash.

Strength Simplicity the Snap Ring of Triple Effectiveness

Patent Applied For

Date .....

BAILEY-DRAKE CO., Inc.
1120 South Michigan Ave. CHICAGO, ILL.

Gentlemen:—Send full information and prices on Trione Piston Rings. Also a copy of your booklet.

Business .....

Name .....

Street .....

Town .....

State .....

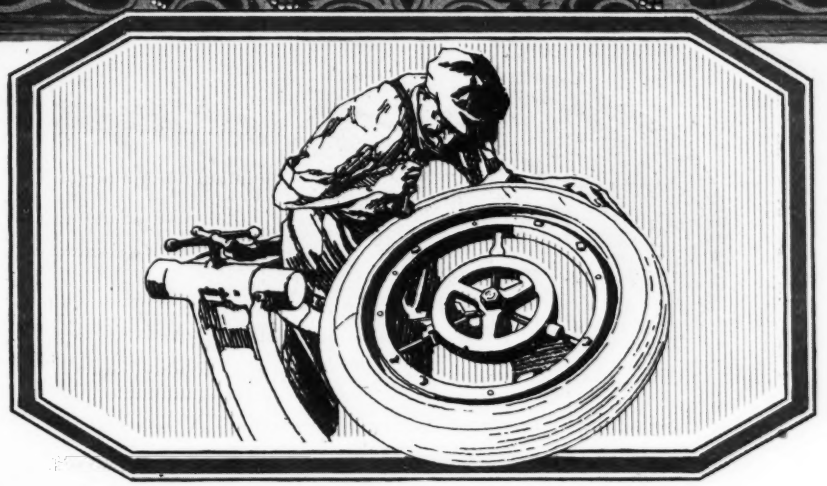
MA-11-6-9



Curing By Internal Hydraulic Expansion Is the Best Mileage Guarantee a Tire Ever Had

It Absolutely Banishes Structural Defects That Cause Most Tire Troubles

National Speedway Tires



You Can't Build a Tire With Printers' Type

NO MERE "scrap of paper" can make a defective tire yield its guaranteed mileage.

Let mold pinch or fabric bruise develop during curing—and the tire is going to *give out* before its time, guarantee or no guarantee. Here is where the motorist learns the difference between printed mileage and road mileage.

It is hard—frequently impossible—to discover the defects that occur under mold pressure. They don't show on the tread or sidewall. But they show quickly enough when the tire is in service: through a premature blowout.

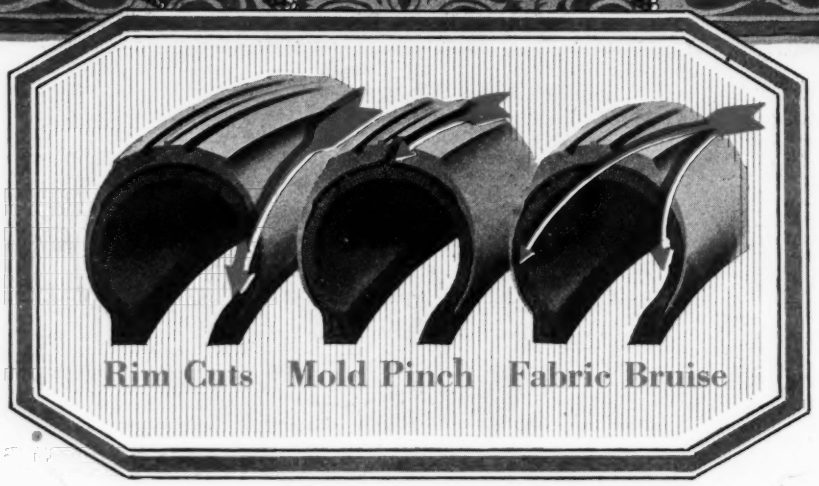
External Pressure Does the Mischief

When a tire is built up on a solid iron core, and then placed—core and all—into the mold to be squeezed into shape by the pressure of two enormous iron jaws, the slightest misstep is sure to prove costly. The fabric may be pinched up into the cushion stock—or into the very tread itself. It may be pulled into a thinner gauge or pushed into a thicker gauge. If it is a clincher tire, the bead may be crowded up into the sidewall.

If it is a straight side tire the wire braid or cable may be displaced from its position in the bead.

Any of these things can happen—and do happen—to tires that are cured by external pressure. And you have adjustments to make, dissatisfaction to contend with, excuses to find: Trouble without end.

National Speedway Tires



The New Way of Curing National Speedway Tires Has Practically Abolished Adjustments

OUT of every two thousand National Speedway Tires sold since the adoption of the new process of curing, only *one* has come back for adjustment.

Only a method that makes for uniform exactness could produce a tire capable of establishing such a record.

Some manufacturers have tried—and are still trying—to avoid the evil consequences of external curing, by substituting tape wrapping for a mold, and producing pressure *internally* by means of air bags. But air bags cannot be inflated to sufficient pressure to insure the carcass being welded into an inseparable unit. There is always the danger of tread separation.

Yet internal curing is the only way of overcoming the great run of tire ills.

And it was National Speedway engineers who discovered a way of applying internal pressure *hydraulically,* so that every ounce of force required to obtain perfect vulcanization could be used.

National Speedway Tires are assembled on a collapsible iron core which is removed before the tire is placed into the mold. The mold closes without pressure. A specially designed inner tube—same shape and size as the inside of the finished casing—is inserted in the carcass, *and then subjected to an expanding water pressure of* 200 *lbs. to the square inch.*

This makes the structurally perfect tire —NATIONAL SPEEDWAY.

It is an expensive process. But—practically no seconds; adjustments reduced to an almost costless minimum. So there are big savings. And these are shared with the purchaser.

National Speedway Tires are listed at lower prices than other tires of similar rating. They can afford to be—for they suffer so few come-backs.

National Speedway Tires



We Have Evolved a New Trade Policy That Greatly Increases the Dealer's Chances to Build Big, Profitable, Enduring Tire Business

Men with big ability are a bigger asset to us than men with big capital.

We want connections for the wealth of human selling energy they will give us.

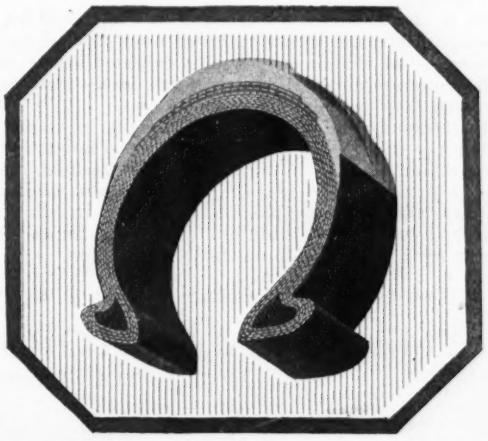
Where there are such dealers, we offer something new in intimate co-operation and generous profit sharing.

Every help, where it will increase productivity, will be extended—if needed.

But there must be real proof. **And quick action.**

We will have to disappoint some dealers, whose territory has already been assigned to others.

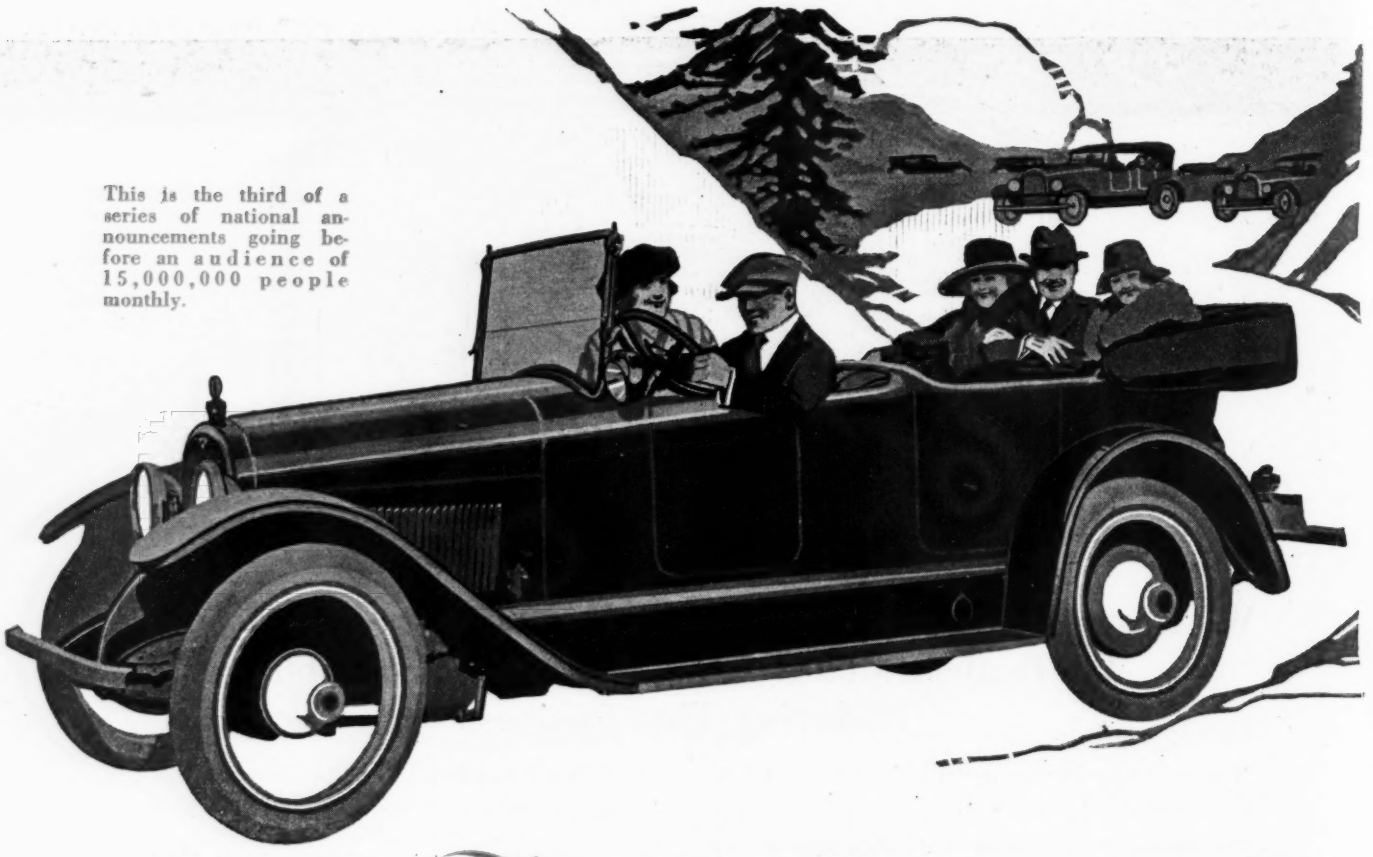
So you cannot afford to waste time. A simple inquiry on your business letterhead will bring all the facts. Write today.



National Rubber Products Corporation

600-662
North Broad Street
PHILADELPHIA, PA.

National Speedway Tires



This is the third of a series of national announcements going before an audience of 15,000,000 people monthly.

The SMILE CAR



WILLIAM COLLIER and his smile (somewhat subdued by the actor's strike) behind the wheel of the AMERICAN.

Motoring has a new meaning for owners of the AMERICAN Balanced Six.
Cradled in comfort and security over the balanced AMERICAN chassis, you ride with a new sense of ease and satisfaction. For the first time you experience the *complete* joy of motoring.
Due to the scientific distribution of weight, which is the outstanding characteristic of this Balanced Six, the load is divided over each of the four wheels *almost to the fraction of a pound.* The chassis is not underweighted at the rear nor overweighted at the front. Each wheel carries an *equal* share of the load—with an effect upon the riding qualities of the car that is little short of amazing.
At all speeds and under all conditions of travel the AMERICAN holds the road as no other car does. There is no slip—no sidesway when you take sharp turns. No skidding in ticklish places. It fairly hugs the roadbed.
For this reason The AMERICAN is known, wherever it goes, as the Smile car.
Behind the wheel of this Balanced Six in all truth the Miles become Smiles. Trouble never sits as your companion. In city traffic or on the open road you are equally at ease. Your AMERICAN will not fail you.

TOURING CARS ROADSTERS SEDAN S 45 HORSEPO

AMERICAN MOTORS CORPORATION

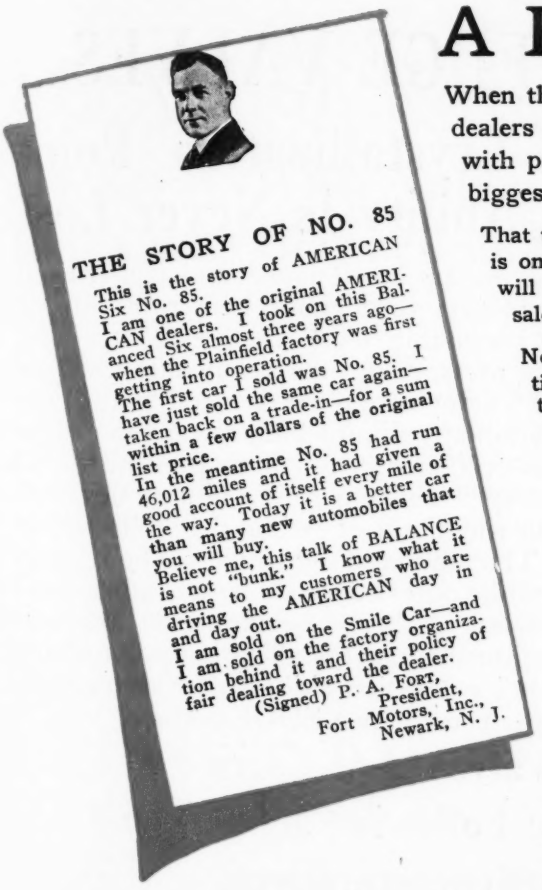
FACTORY: PLAINFIELD, NEW JERSEY

AMERICAN

The Balanced Six

MILES OF SMILES

AMERICAN
The Balanced Six
MILES OF SMILES



A Franchise Extraordinary!

When the AMERICAN Balanced Six was in swaddling clothes, certain few dealers had the vision to see in this lusty youngster a future pregnant with possibilities that would sooner or later equal or surpass some of the biggest successes in the field.

That this confidence was not misplaced is evidenced by the fact that today there is one AMERICAN distributor whose deliveries of this Balanced Six this year will reach a total of $3,000,000. There are a score or more others whose annual sales run into hundreds of thousands of dollars.

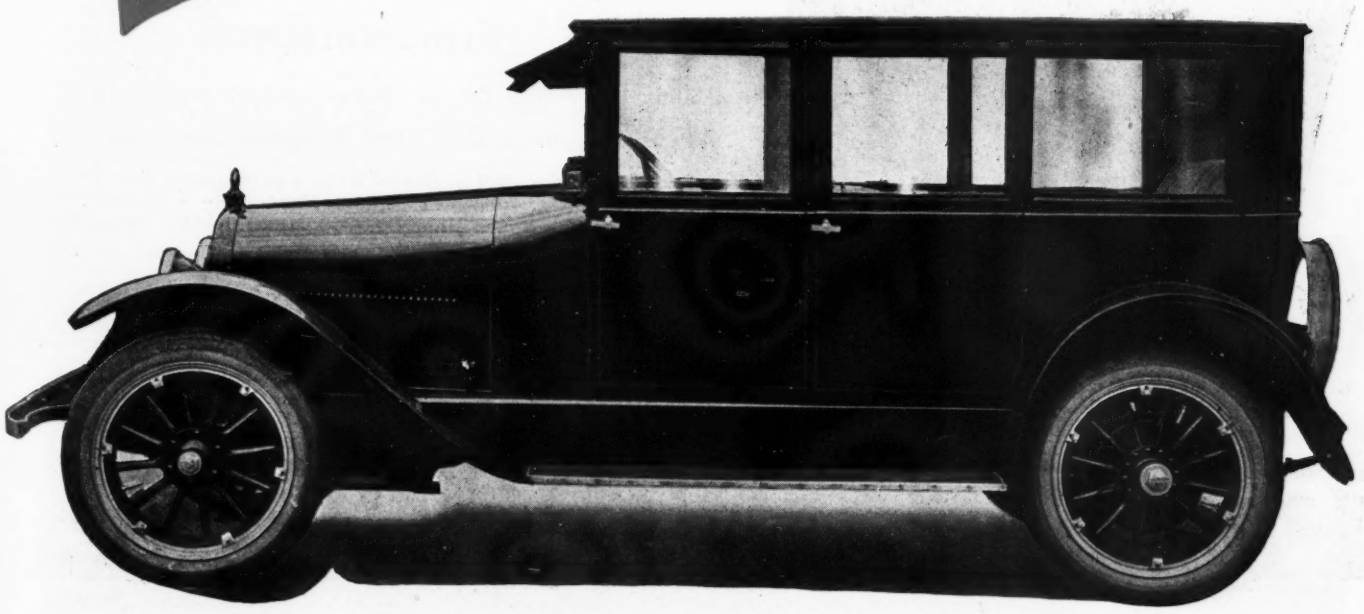
Now well "over the top," and under the spotlight of an intensive national advertising campaign, the demand for this Balanced Six is growing with a rapidity that is overwhelming. For the dealer no less than the individual owner, the AMERICAN is really the Smile Car.

THE AMERICAN SEDAN SEXTET

Within three weeks of the introduction of the new AMERICAN Sedan, the demand for this model has reached a point where it was necessary to DOUBLE the factory production orders. This popular model now rounds out the AMERICAN line, which consists of Touring Cars, Roadsters and Sedans.

NOW is the time to identify yourself with the AMERICAN. It is a "ground floor" opportunity that no live dealer can afford to overlook. Write or wire for further information.

AMERICAN MOTORS CORPORATION
FACTORY: PLAINFIELD, NEW JERSEY



Flexedge
SELF-SEATING
LAMINATED VALVES
Sensible-Logical-Inevitable
A Valve-Seat Carbon Remover at Work While You Drive

The Genuine Flexedge Trade-Mark

FLEXEDGE VALVES



Full Particulars on Request

Have No Crystallization Point the Flexation Ability Is Never Lost

FLEXEDGE Valves are so designed and constructed that they will function throughout the entire life of the valve. The paper-thin discs are pressed together under tremendous pressure in such a way that they are rigid, and almost a composite piece of metal at the center, the rigidity gradually diminishing toward the outer edges where it is still great enough to prevent excessive flexation, but sufficient to permit a minute flexation which removes the tiny flecks of carbon that collect after each explosion. The gradual diminishing of the rigidity from the center to the outer edges allows a gradual flexation, which does not make its beginning at any one point. Therefore, there is no crystallization point where the metal can lose its flexation ability after continuous use. This is an exclusive FLEXEDGE feature.

Flexedge Valves Are Carried in Stock By the Following Jobbers and Representatives:

Motor Car Supply Co., of Chicago, 1451-3-5 Michigan Ave., Chicago.
Federal Appliance Corp., 1966 Broadway, New York City, N. Y.
Joseph D. Tripp, 909 S. Grand Ave., Los Angeles, Cal.
Reinhard Bros., Inc., Minneapolis, Minn.
"Kant Break" Spark Plug Co., 330 Madison Ave., Memphis, Tenn.
Repass Automobile Co., Waterloo, Iowa.
United Motor Company, Houston, Tex.
Herring Motor Company, Des Moines, Iowa.
Motor & Machinists Supply Co., Kansas City, Mo.
The Gibson Company, Indianapolis, Ind.
Chicago Automobile Supply House, 1349-53 Michigan Ave., Chicago, Ill.
Armentrout & Sons, Washington, D. C.

SELF SEATING VALVE CO.

The Genuine Flexedge Imprint



FLEXEDGE VALVES

Do Away With Valve Grinding— that's why they sell so easy, summer or winter

FLEXEDGE Valves sell on sight. The merits of the principles involved are so apparent that manufacturers, dealers and motor car users accept at a glance, the extraordinary advantages and benefits to be derived.

FLEXEDGE Valves sell the whole year 'round, and regardless of the temperature or climatic conditions, winter or summer, they completely eliminate the necessity of valve grinding. This is an outstanding feature which appeals extraordinarily to car owners.

Dealers state that FLEXEDGE Valves get the car owner's attention immediately—that it isn't so much a matter of selling as it is of getting sufficient stock to supply the ever-increasing demand.



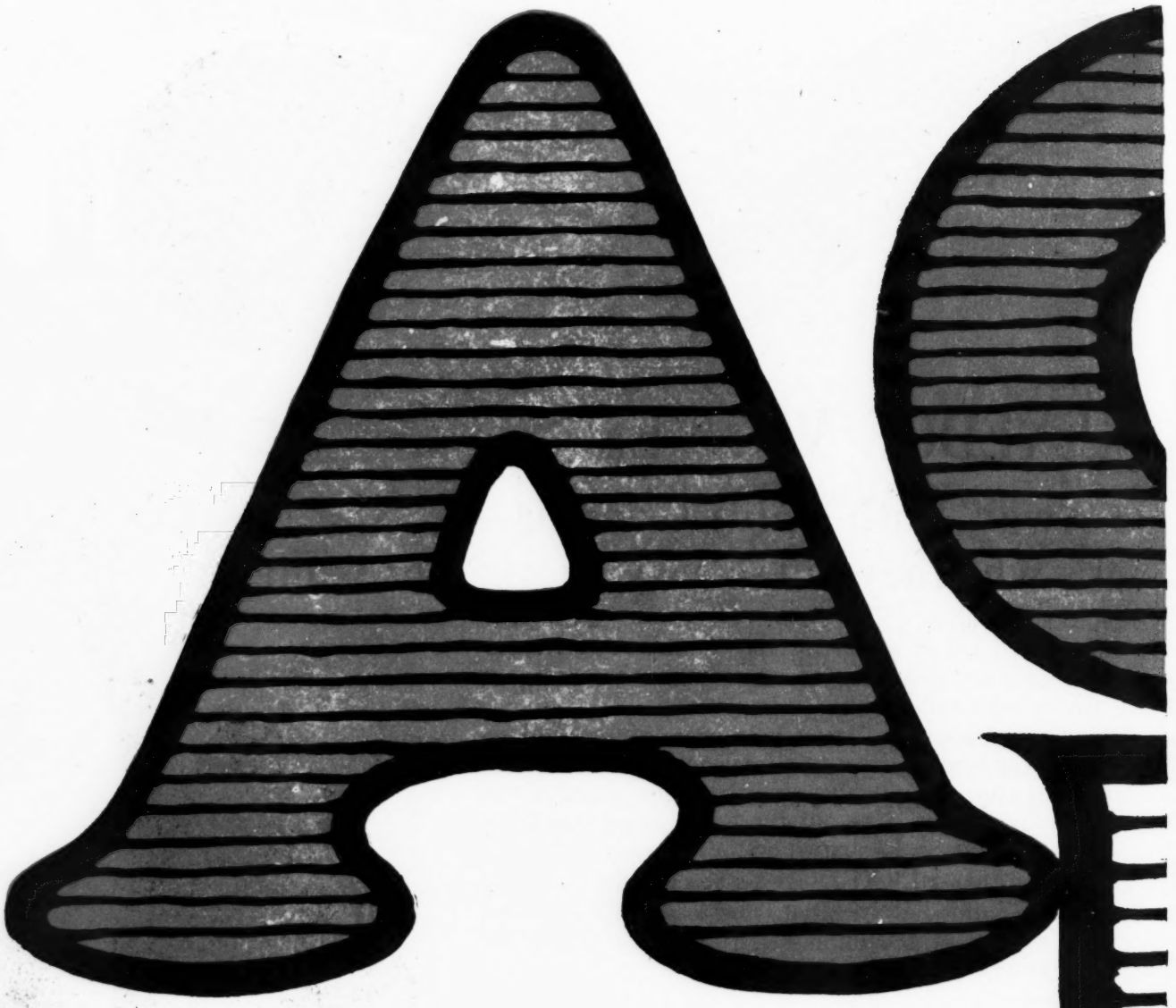
Send for A Test Pair

Flexedge Retail Prices

Order Through Your Jobber

Fords	$0.50 each
Chevrolet	.75 "
Buick D44	2.00 "
Buick D45	2.00 "
Buick D35	1.25 "
Oakland Six	1.25 "
Franklin, Model B	2.00 "
Saxon Six	1.25 "
Grant Six	1.25 "
Elgin Six	1.25 "
Oldsmobile 37	1.25 "
Oldsmobile 45	1.25 "
Henderson Motor Cycle	1.00 "
Dodge	1.75 "
Maxwell	1.25 "
Briscoe	1.25 "
Hudson 6-40	1.25 "
Paige 55	2.00 "
Overland Country Club	1.25 "
Overland 83-B	2.00 "
Premier	2.00 "
Packard Twin Six	2.00 "
Buick D55	2.50 "
Oldsmobile 43	2.50 "
Buick E45 inlet	2.00 "
Buick E45 exhaust	2.25 "

706-8 Townsend St. Chicago, Ill.



The War's Best Lesson

During the war we made parts on which the chief demand was for Accuracy and Quality.

Our entire organization was saturated with these ideals—Accuracy and Quality.

Our performance on Government contracts was so efficient that we had no rejections.

The Benefits Remain

When we went back to our Truck production for peace purposes, we knew our lesson perfectly: —Accuracy and Quality.

We realized that business had been lacking in Accuracy and Quality, but that no permanently good or profitable product could come out of a shop that didn't work to these ideals—Accuracy and Quality. So we made Ace Trucks to the moral and ethical standard instead of to price.

We went beyond the habitual requirements in Truck manufacture and made a complete Truck, because the war taught the general public that it was foolish and wasteful to do things half-way.

Now the Public Demands the Real Thing

The Public demands genuine high quality today. The Public is the final judge, and the Public insists on absolute quality—real goods—better than ever production.

Ace

The AMERICAN MOTOR TRUCK COMPANY
NEWARK OHIO.



That's Ace Trucks

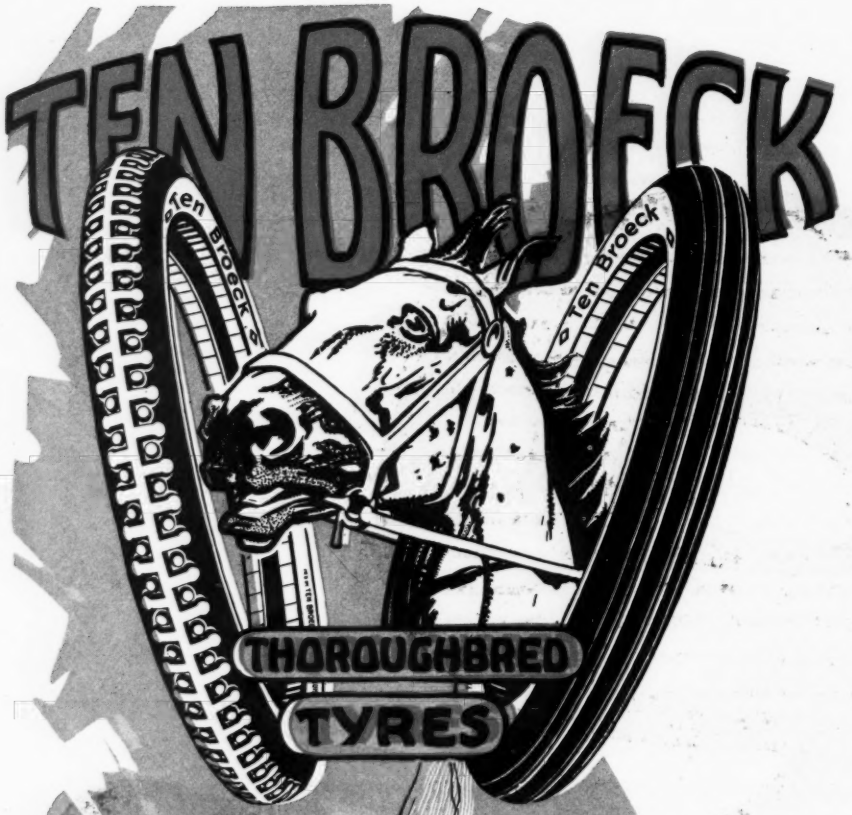
The Public knows that quality pays. The Public is ready for prices that signify quality. The Public also has learned the war's best lesson, and insists on examination, inspection, tests, proof, and absolute conviction as to Accuracy and Quality.

On this basis Ace Trucks, completely equipped, are reasonably and attractively priced, and the volume of orders booked by deposits and covered by present contracts proves this.

2½ Ton $3500 - 1½ Ton $2800
¾ Ton and 3½ Ton
(ready soon) Prices Later

Ace

The AMERICAN MOTOR TRUCK COMPANY
NEWARK OHIO.



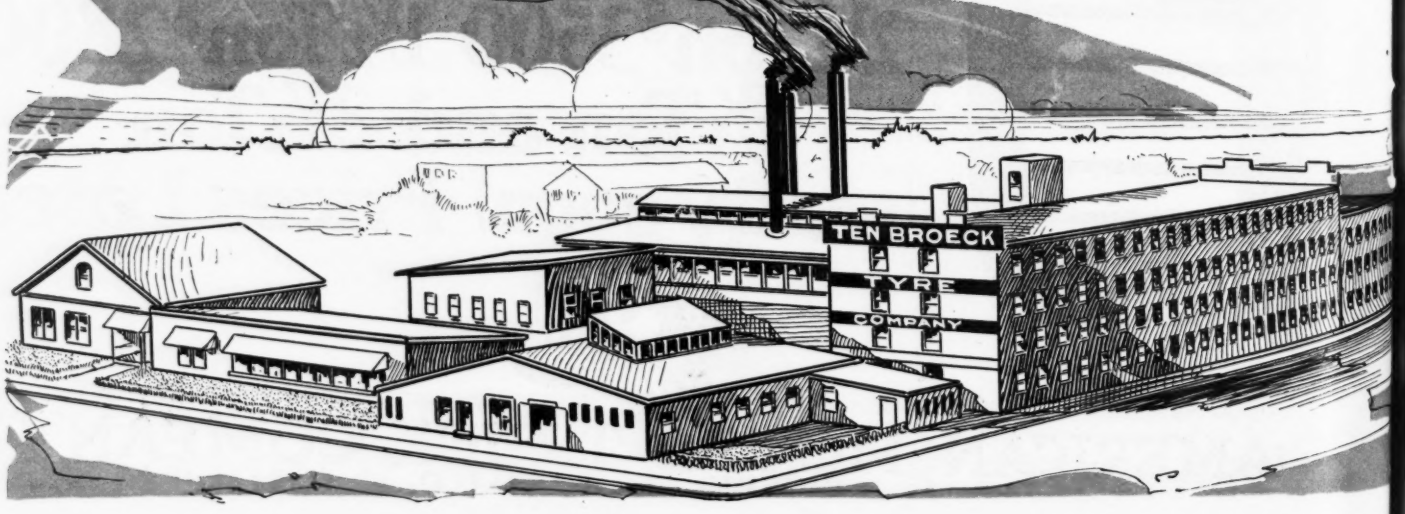
TEN BROECK "Thoroughbred" Tires are made entirely within the TEN BROECK plants.

A most modern factory, equipped with the latest designed tire making machinery planned to cut down production costs by eliminating unnecessary manufacturing operations permits the production of the highest grade tire possible.

TEN BROECK production is supervised by experts who have secured a broad knowledge and experience in manufacturing tires.

"Thoroughbred" Tires are built with the greatest of care. They are thoroughly inspected, and furnished to dealers with the positive assurance that they will stand up in service in accordance with every claim made for them.

TEN BROECK
LOUISVILLE.



TEN BROECK
Thoroughbred Tyres
8000 MILES

And now comes an extraordinary tire—a tire combining long lasting qualities and attractive design — a tire which will give exceptional service.

This extraordinary tire was built for live dealers throughout the nation to sell—for particular motor car owners who demand the best to buy and use month after month with thousands of additional miles of service.

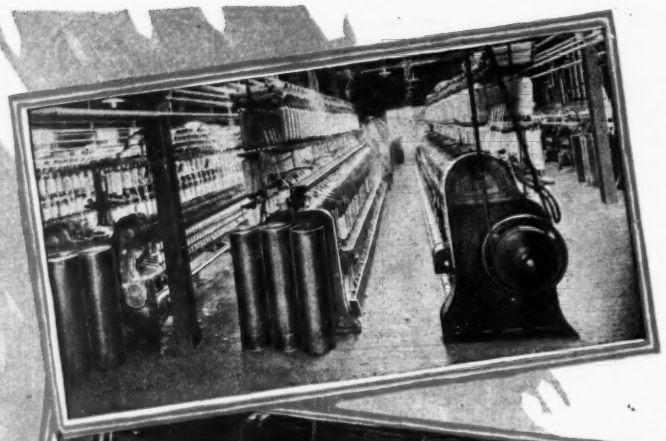
The story of this wonderful tire is interesting indeed — a story which we want to tell to every dealer in the country who has the business vision to greet an exclusive agency proposition which is isolated from all competition—which stands alone, as it were, backed by an unusual guarantee of 8000 miles.

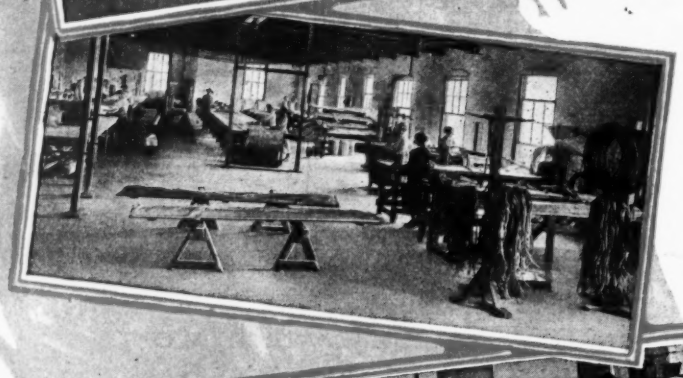
And the key-note of this remarkable TEN BROECK policy is our assurance that every TEN BROECK dealer is thoroughly protected —without equivocation.

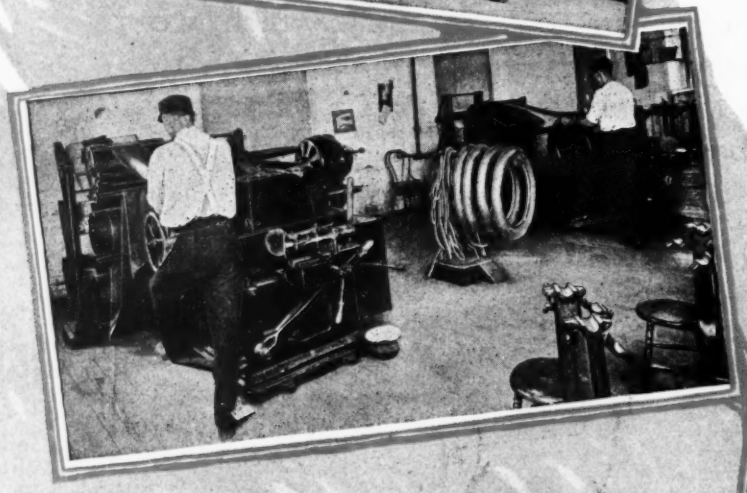
Exclusive representation in your territory will be responsible for a volume of profitable business. This proposition awaits your inquiry.

TYRE COMPANY
KENTUCKY







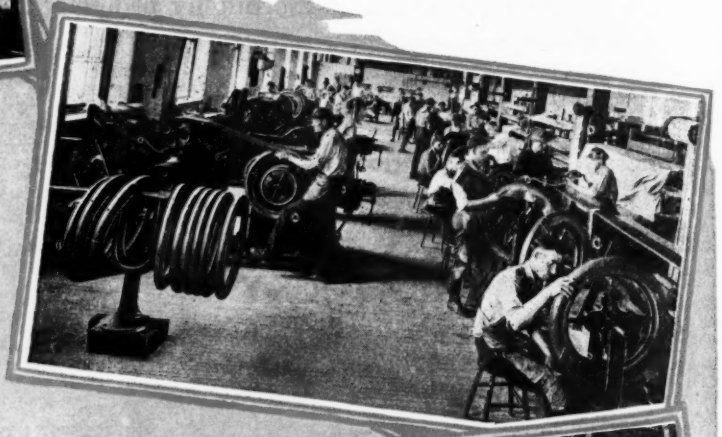


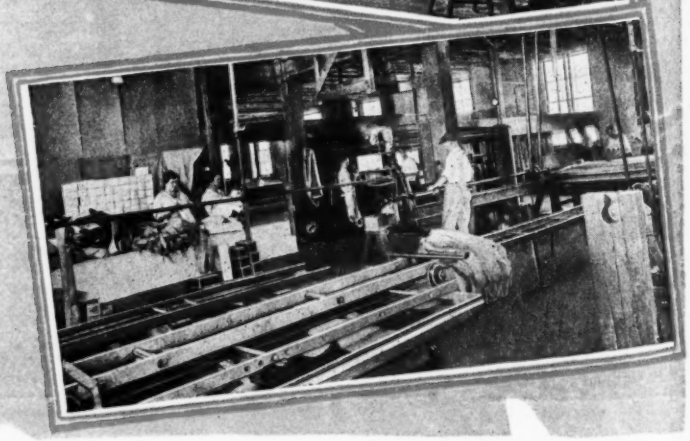
TEN BROECK tire manufacturing equipment includes every modern mechanical accomplishment in accordance with approved engineering ethics. The TEN BROECK plant is one of less than a dozen American tire and rubber factories which has its own cotton mills located on its own premises.

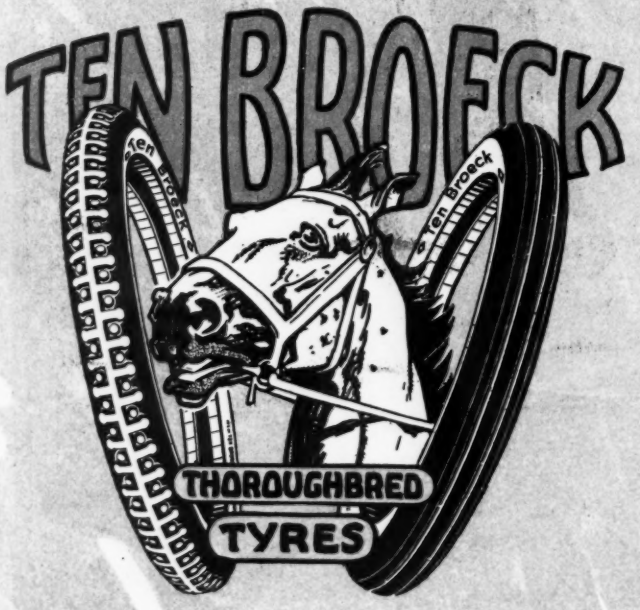
The organization is well balanced. Hundreds of happy and contented workers strive eagerly to build tires which are indeed "thoroughbreds."

The TEN BROECK construction is bound to make good—the highest grades of Virgin rubber in our compounds, a genuine Sea Island, long staple cotton for our fabric—oversize mold and core equipment, automatic unit molded, method of vulcanization, five plies to 3½" carcass, and nine expert inspections of every tire—what more?

TEN BROECK TYRE CO.
Louisville Kentucky







TEN BROECK POLICY
Means Genuine Dealer Protection

TEN BROECK dealers are chosen carefully — because every TEN BROECK dealer is clothed with the same authority as if he were one of our factory representatives.

Frankly speaking, we depend upon our dealers to put into effect the service and satisfaction which we claim for "thoroughbred" tires.

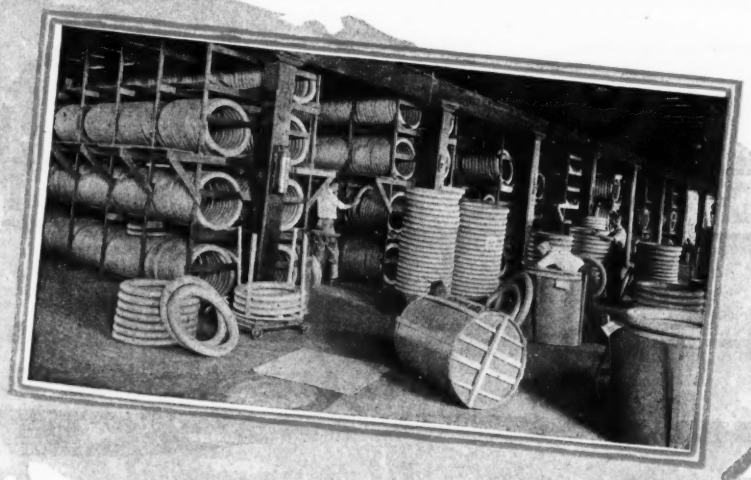
All adjustments are made by the dealer himself, and we wish to do business only with those dealers who can appreciate the responsibility to himself and the product which he assumes in representing this wonderful tire.

In fact, every TEN BROECK dealer is a part of our organization—and his interest is measured in dollars—more dollars than he can possibly earn from the sale of any other tire offered.

If you are the caliber of dealer who can accept a volume of business, and furnish a genuine, honest, and efficient service, we have a proposition which will meet with your ideas of doing business in a big, profitable way. If you are that man, wire, telephone, write, or come direct.

It means much to us—and more to you.

TEN BROECK TYRE CO.
Louisville, Kentucky.



TEN BROECK TYRE CO.
Louisville, Kentucky.

Gentlemen:
I am in a position to represent a good line of tires in my territory. You are at liberty to submit complete details of your selling plan for dealers.

Name .....

Address .....



The secret of Triplexd performance is Triplexd construction — three inseparable layers — metal, rubber and fabric—combined into a permanent unit by our exclusive manufacturing processes.

When Any Pump Makers Sends

You Will Find It Equipped With TRIPLEXD HOSE

THEY furnish you Triplexd because it gives you better service and saves you money on replacements.

It resists leaks and is as near evaporation-proof as a hose can be made.

Its construction prevents the formation of a rubber sediment in your gasoline, and at the same time prevents the gasoline from destroying the rubber layer of the hose.

It is equipped with couplings of our own design, made in our own plant.

It is light, durable, non-kinking and unusually flexible.

It gives you an average service of over two years—with a guaranteed minimum of one year.

TRIP

XXX GASOLIN

TRADE MARK REG



of These
You a Pump

When Your Present Gasoline Hose Gives Out—

See that it is replaced with the best hose you can get—not the most expensive but the most serviceable—Triplexd.

Your pump maker protects you in the first instance by giving you Triplexd—when you need a new hose be sure it is also Triplexd.

If your pump was not equipped with Triplexd originally—specify Triplexd for replacement—you will require fewer replacements thereafter.

METAL HOSE & TUBING CO.
235 Tillary Street
BROOKLYN, N.Y.

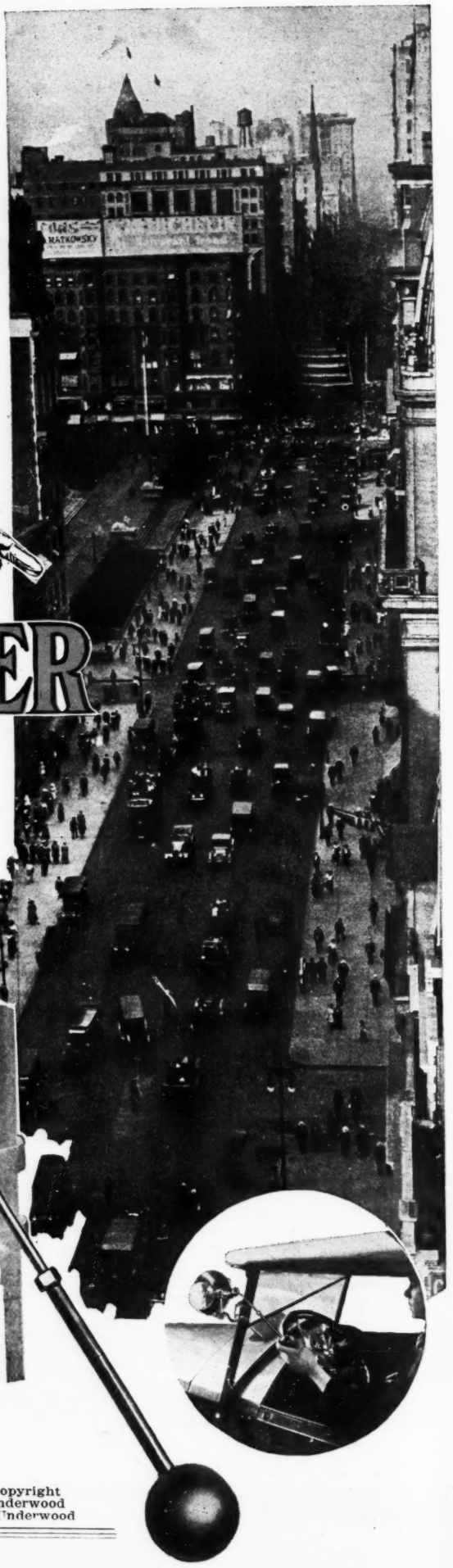
Every length of Triplexd pump hose has, wired to the coupling, a waterproof envelope containing the washers for attaching and a signed guarantee card, numbered with the serial number stamped on the coupling. With this card is a stamped postal with which you register with us the date the length goes into service. We guarantee you one year's trouble-free service from that date.



TRIPLEXD
HOSE XXX
. U.S. PAT. OFF.



"Every One of Those Cars Needs It!"



The JIFFY SPOTTER

TRADE MARK

Brings the Spotlight Control Close to the Steering Wheel

Every car in your town needs the JIFFY Spotter too. It's an extension handle for spotlights, adjustable to any length and to any position. The driver operates the spotlight without taking his left hand more than a few inches from the steering wheel. Greatly increased safety is the result. The driver does not have to lean forward in an uncomfortable, awkward position.

The JIFFY Spotter adds to the appearance of any car—all metal parts are beautifully finished in a combination of nickel and black rubber japan with jet black wooden ball for grip—sets down out of way when not in use—fits all spotlights—attached in a few minutes by anyone.

Dealers—The JIFFY Spotter helps to sell new spotlights and sells readily to present spotlight owners. Our proposition is very attractive. Write for details, mentioning your jobber's name.



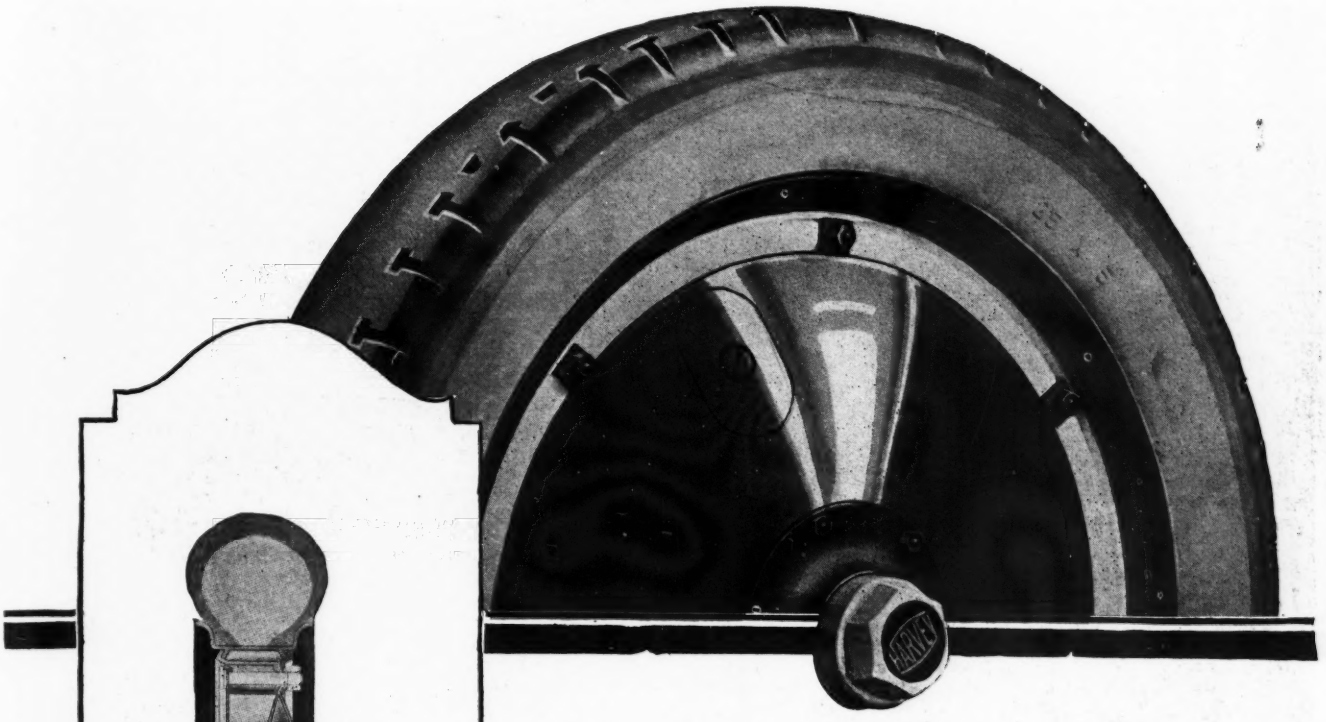
PRICE

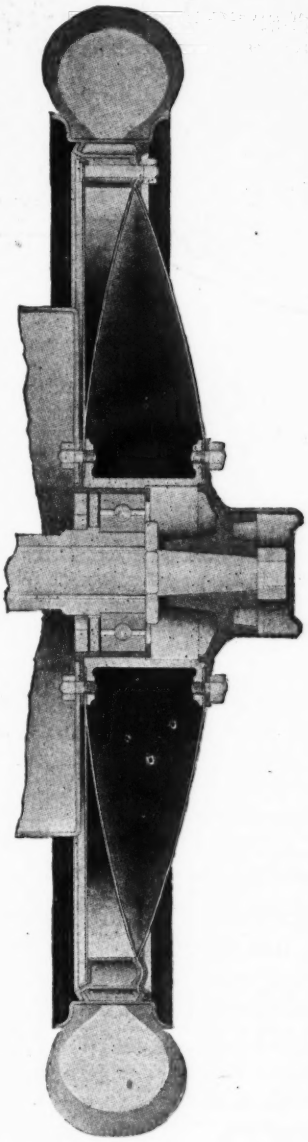
$2.50

DETROIT AUTO ACCESSORIES CO., Inc.

1616 N. Robey St. Chicago, U. S. A.

Copyright Underwood & Underwood





A Steel Wheel Built for an Automobile

Not a Makeshift for the Sake of Appearance

The HARVEY STEEL WHEEL is the only scientifically constructed triple-disc steel wheel ever designed for the motor car. It has all the elements of strength, durability, safety, and lastly—tire-changing simplicity.

Three 20 gauge steel discs scientifically combined in a solid unit, giving all the strength of a solid wheel, in a hollow wheel, without the excess weight. Guaranteed to be immune from "side swipe," buckling and to safely stand the usual road tests applied to two-ton truck wheels.

It has the only demountable self inter-locking rim ever introduced on a steel wheel. Tires can be changed in less than two minutes.

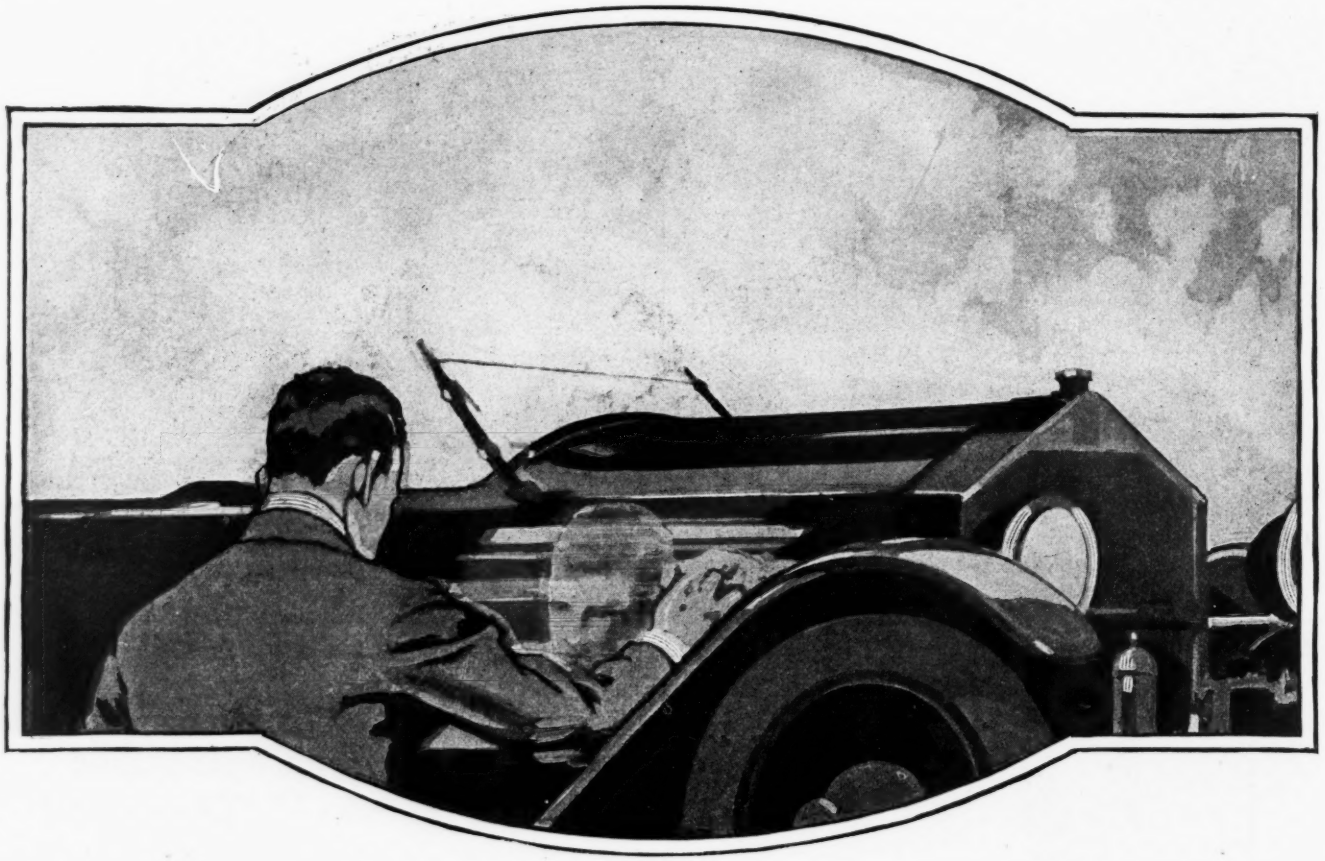
Dealers: Your accessories are for motor cars. Sell HARVEY STEEL WHEELS the same way under the same principle. Don't be satisfied to handle a wheel that has a grouchy come-back. Let your customers have the advantage of owning a steel wheel that you can guarantee, in perfect confidence. A wheel you'll never have to apologize for.

The demand that will follow the national introduction of the HARVEY STEEL WHEEL will surprise the entire industry.

Mail a two-cent stamp today for our illustrated booklet, giving mechanical details of construction and dealers' discounts.

HARVEY RIM AND WHEEL COMPANY
Buffalo, New York

HARVEY
STEEL · WHEELS



Leaves a Lustre that Lasts

CRYSTAL POLISH gives a lustre that lasts—saving a lot of "elbow grease."

It is the only polish that *does not collect dust.* Crystal contains no paraffin—it leaves no oily surface to catch dirt particles.

Crystal Polish *cleans*—polishes and restores the factory finish.

Your customers will soon know Crystal's superior merits—it is up to you to display it and have our attractive display cut-out to aid in selling it. The dealer who stocks up now will begin the building of a fine re-sale business.

You make big profits selling Crystal Polish—large enough for you to give this product your time and attention. Write for our co-operative selling plan and *attractive discounts.*

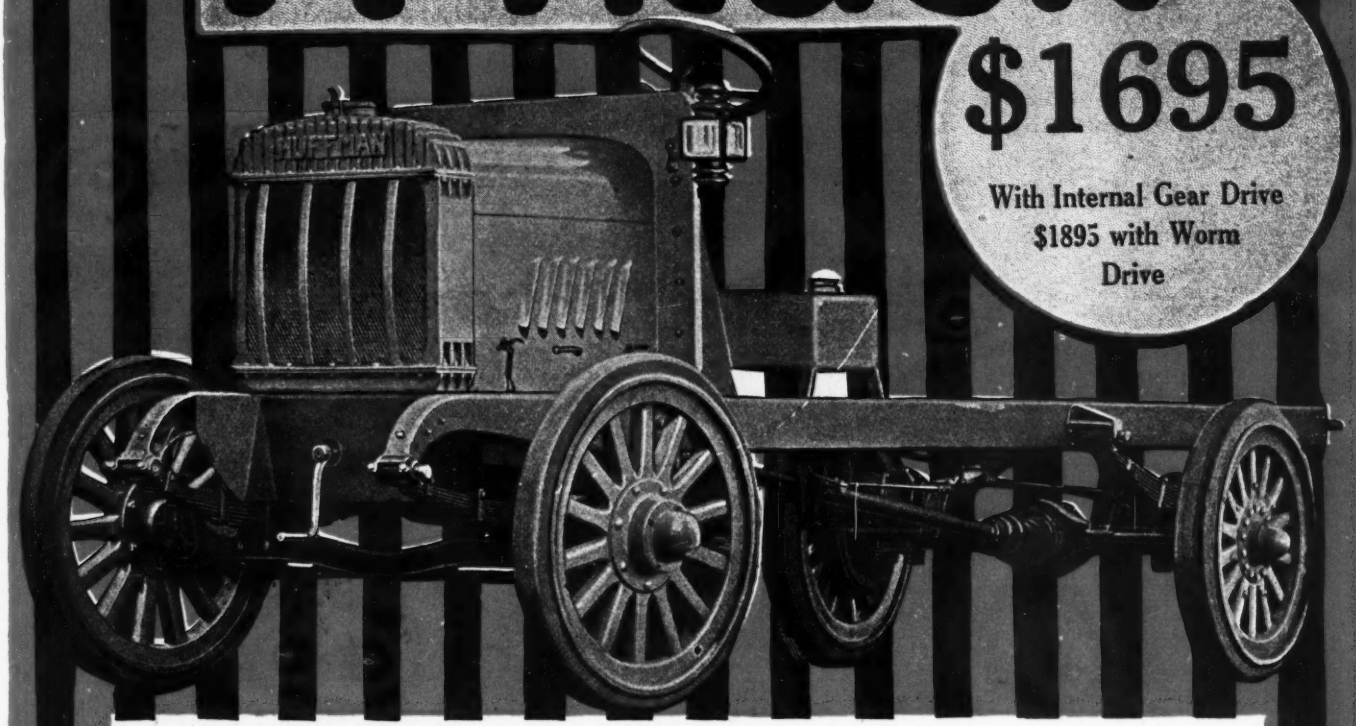
Dealers if your jobber does not have Crystal Polish send us his name and we'll see that you are supplied. JOBBERS we are prepared to make prompt shipments.

I. KELLERMANN, 1219 Hoe Ave., New York City



Crystal Polish

The HUFFMAN TRUCK



$1695

With Internal Gear Drive
$1895 with Worm Drive

It Pays to Sell a Quality Truck

Investigate the HUFFMAN—a truck of 2,000 to 5,500 lbs. carrying capacity, including body weight. It's an unusual truck, unusual in price and unusual in performance.

GENERAL SPECIFICATIONS

MOTOR—4 cyl. Continental—Red Seal.
IGNITION—Dixie High Tension Magneto.
CARBURETOR—Zenith.
CLUTCH—Fuller—Dry Disc Type.
TRANSMISSION—Fuller—Unit Power Plant Type.
STEERING GEAR—Lavine Irreversible.
FRAME—Hydraulic Pressed Steel Channel.
FRONT AXLE—Drop Forging with Timken Bearings.
REAR AXLE—Torbensen Internal Gear or Standard Worm Drive.
SPRINGS—Perfection—Special Design.
TIRES—Firestone.
WHEELBASE—140 inches.
LOADING SPACE—10½ ft. from rear of seat to end of frame.
CHASSIS WEIGHT—3200 lbs.

Progressive, up-to-the-minute engineering gives the HUFFMAN speed and flexibility for light loads and power and strength for heavy loads. It's an all-purpose truck of quality. **Investigate it.** Write for our dealer plan.

HUFFMAN BROTHERS MOTOR CO.
Main Office and Factory—Elkhart, Ind.

Branch and Showroom
2425 Michigan Ave., Chicago, U. S. A.

Sell the Warning Signal That Meets Every Demand

The ROEDDING Signal Tail Light tells the man behind in large, clear, unmistakable letters, just what to do. Whether it is STOP, RIGHT, LEFT or BACK, the large 10-inch ROEDDING flashes a signal that eliminates all guesswork.

Simple to operate. Just press the proper signal on disc attached to steering wheel. You protect yourself and protect the man behind you.



ROEDDING SIGNAL TAIL LIGHT TRADE MARK

EASY TO INSTALL

The ROEDDING can be quickly installed by yourself. It is waterproof, dust-proof and fool-proof. There is nothing to get out of order.

DEALERS—The demand for ROEDDING Tail Light Signals is rapidly increasing because it fills a long-felt want. It is up to you to cash in—with quick profits—on this insistent demand. Write us for particulars—NOW.

Grand Rapids Brass Company

90 Scribner Ave., N. W. Grand Rapids, Mich.

Exhibit Nov. 3-8
Hotel Sherman, Mezzanine Floor
Chicago



WIZARD

OUR GUARANTEE

We hereby guarantee "WIZARD" GAS TONIC AND DECARBONIZER TO BE FREE FROM ANY ACIDS OR OTHER INGREDIENTS which are in ANY WAY INJURIOUS TO THE MOTOR. That it will remove and prevent carbon from forming inside a motor in which it is used according to our directions, and that it will increase power and mileage and decrease fuel consumption in any motor. If, after you have thoroughly tested "WIZARD" by using up to 25 tablets, you are not perfectly satisfied, return the original package with the unused remaining tablets to us, and the purchase price will be promptly refunded to you.

MANUFACTURED BY
WIZARD PRODUCTS CO.
Inc.
BUFFALO, N. Y.
U. S. A.

100 for $1.00

Compels the "GAS" to be good—

"Wizard" stops and cures carbon troubles, also.

"Wizard" in the fuel tank—one tablet to each gallon—decreases fuel consumption and increases mile-ability materially.

Read our guarantee again—read it carefully—see how chemical analysis certifies "Wizard" as harmless to engine, etc. Prove "Wizard" to yourself—it can't cost you anything if it doesn't work satisfactorily—Then, be a "Wizard" booster. Remember!—"Wizard" in the fuel tank gives more miles, costs less gas—renews engine energy, and is usable for Car, Truck, Motor Boat, Tractor, and with Gasoline, Kerosene, or Distillate.

Under the most unfavorable conditions of cold weather "Wizard" insures more power, speed, perfect ignition, easier starting, quicker pick-ups and a quicker acting motor. Get ready for the Winter now.

There is but one "Wizard"—we make it. Write, and get acquainted with "Wizard," the great fuel tonic.

DISTRIBUTORS ATTENTION: Exclusive territorial arrangements available in some sections for HIGH CLASS DISTRIBUTORS, on a basis which permits them to build a successful and permanent business. SECURE YOUR TERRITORY NOW.

WIZARD ANALYSIS

When the gas is good—burns clean, 75% of motor troubles are eliminated.

And "Wizard", backed by a hole-proof, iron-clad, money-back guarantee, *compels* the gas to be good. The theory is simple—the results are remarkable.

"Wizard" is a gas accelerator: a chemical kin to gasoline that attacks its physical properties and makes it less resistant to mixing with air. "Wizard" converts poor quality gasoline into a powerful zippy combustion fuel and positively will not attack the motor, the carburetor, or other mechanism.



Wizard Products Co., Inc.
Buffalo, N. Y., U. S. A.

CANADIAN REPRESENTATIVE
Aggressive Agencies Co.,
35 Notre Dame East,
Montreal, Canada.

$1.00 for box of 100 Tablets—Treats 100 Gallons of Gasoline.



"Built By Cord Tire Specialists."



EDITORIAL



Following Directions

ARE you one of the motorists who last winter used an anti-freeze compound in a manner which the maker of the preparation never specified and then condemned the stuff as being no good? If you did such a thing, you had better make sure that you followed directions to the letter. The manufacturers of anti-freeze compounds have met car and truck owners more than half way, and the complete directions printed on every label of their products are put there for but one purpose, and that is, to make sure the preparation will be used correctly.

OBVIOUSLY if the motorist does not do his part and merely dumps the stuff in his radiator, without following directions, he does wrong and one morning he will go to his unheated garage only to find the tubes of his radiator burst or the waterjacket cracked. The next thing he does is blame the anti-freeze substance, whereas, had he been careful to follow instructions he could have gone all winter without worrying about the cooling system.

MOST of the anti-freeze preparations have been put up in convenient form, but the amount of water in the cooling system together with the variation in temperature dictate to a considerable extent how the preparations must be used. All this is set forth in the maker's directions and in every case the big thing to watch is that the radiator has no leaks and that the hose couplings are in good shape. In fact, new hose is desirable before adding the anti-freeze, as after a season's use the inner layers become separated.

THE radiator should be washed out carefully with a solution of hot soda, which reveals any leaks that exist. These then should be soldered. Many anti-freeze substances attack dirt and sediment and if your radiator started to leak last winter after you added the anti-freeze, it was because you failed to clean the radiator and repair the leaks. The anti-freeze told you that leaks existed. You probably thought the anti-freeze was eating away the metal. Follow the maker's directions this winter and you will play safe.

Read Our Guarantee on

JOHNSON'S

FREEZE-PROOF



We guarantee that Johnson's Freeze-Proof has no more effect than water on the metals of the radiator or on rubber.

If Johnson's Freeze-Proof is used according to the simple directions in the proportion shown on our scale, it will absolutely protect your radiator against damage from freezing.

We do not guarantee Johnson's Freeze-Proof when used in cars with aluminum manifolds, although it has been used satisfactorily in hundreds of such cars. Water alone often has an injurious effect on aluminum.

$1.50 Protects a Ford

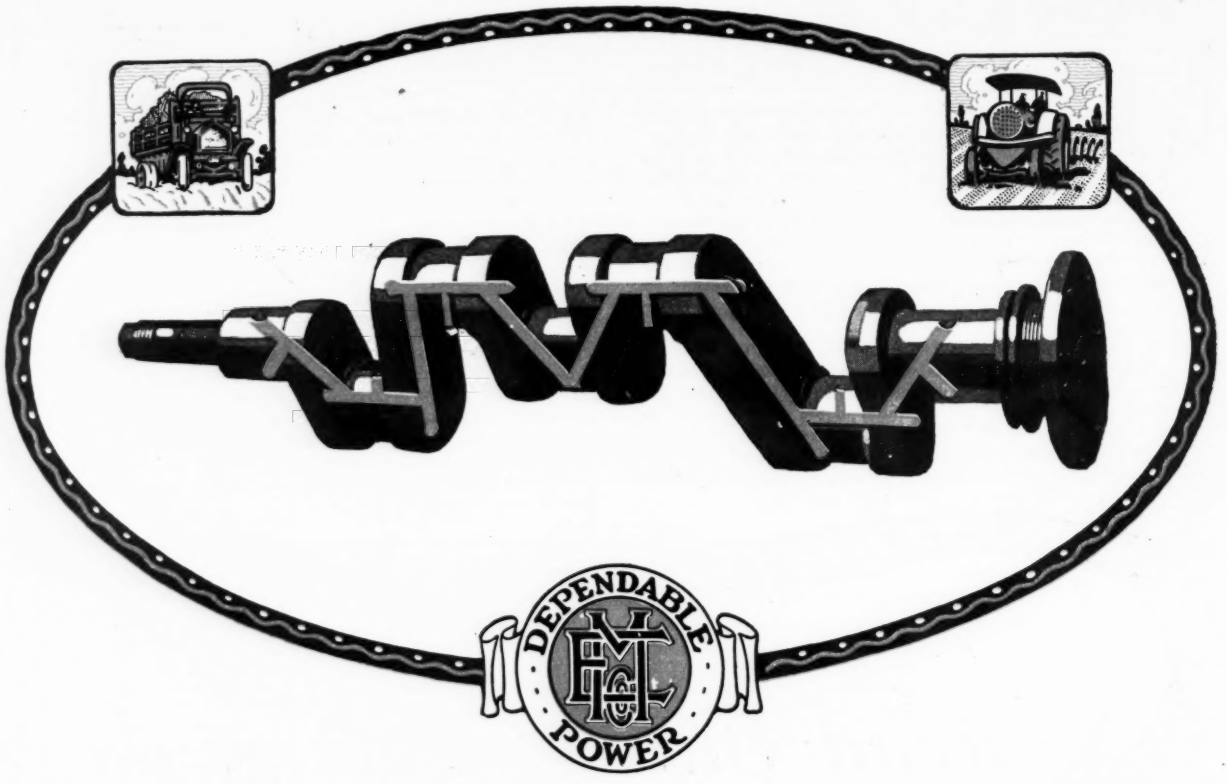
One package of Johnson's Freeze-Proof (Cost $1.50) will protect a Ford to 5 degrees below zero, and two packages to 50 degrees below zero. For larger radiators or to protect to a lower temperature, use additional Freeze-Proof according to the scale on the package.

FOR SALE BY ALL DEALERS

MFD. BY S. C. JOHNSON & SON, RACINE, WIS.

MIDWEST

TRUCK *and* TRACTOR ENGINE



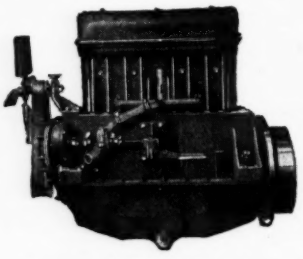
A 100% Truck and Tractor Engine —in no sense a readaption of previous types—embodying all that is good in past practice—incorporating certain obvious improvements found in no other heavy duty engine.

For example, the bearings are floated on a film of oil, assuring long life to the engine. By the pecular correctness of the crankshaft oil vent drilling (illustrated above), oil is brought to bearings at the moment of *least* bearing pressure rather than at moment of greatest bearing pressure, as has been past practice.

The crankshaft measures *three inches in diameter* at bearings—an absolute insurance against whipping and disalignment. This same liberality of dimension is maintained proportionately throughout.

The famous Midwest "Dependable Power" nameplate, backed by fifty years of engine building experience, is your guarantee of sustained and satisfactory service in either truck or tractor.

Sizes 4½ x 6, 4 x 6, 4 x 5, 3½ x 5—all same general design.



For delivery dates and further information, address Sales Division 11.

Midwest Engine Company
Indianapolis, U. S. A.

Dependable Power

HAWKEYE
MOTOR TRUCKS

The Standard Oil Co. uses Hawkeye Trucks at a number of their branches in the Northwest, and we quote from a letter from one of their agents:

"In regard to the Hawkeye Truck, it gives the best satisfaction that anyone could expect. It has been making three and four trips a day ever since I got it, and I have not had a penny expense for oil and gasoline. I can highly recommend a Hawkeye. I expect to buy another Hawkeye if business keeps picking up.'

The Hawkeye is a thoroughly reliable and dependable truck. You are not courting trouble when you sell it to a customer.

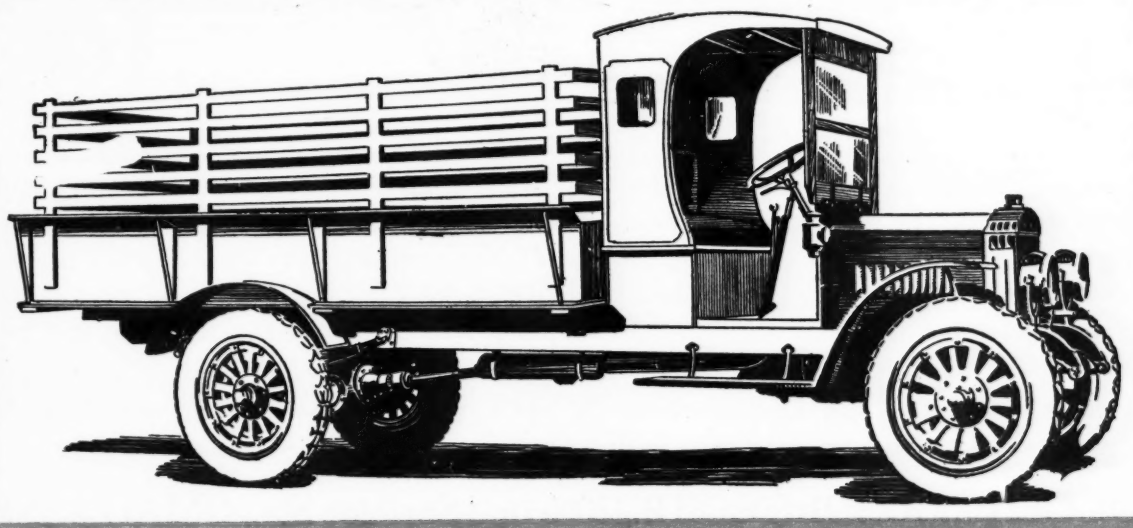
Hundreds of Hawkeyes have been in constant use in the West and Northwest for over two years and have made wonderful records in service and freedom from trouble.

For any dealer in the Western two-thirds of the United States not now supplied with a reliable truck agency, the Hawkeye offers a real opportunity. Write for information.

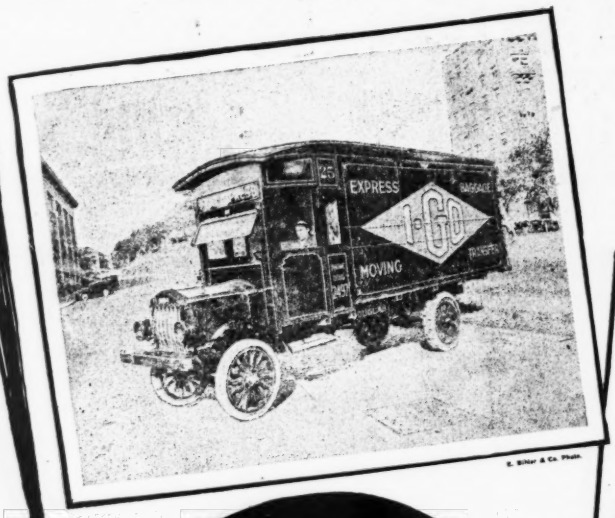
HAWKEYE TRUCK CO.

R. A. BENNETT, President

616 Sixth St., Sioux City, Iowa.



Announcing Douglas TRUCKS



E. Bilor & Co. Photo.

IGO EXPRES
315 South Nineteenth Stree
Omaha, Neb. Sept. 23, 1919.

Omaha Daily News,
Omaha, Nebraska.

Attention Mr. N. C. Taylor,
Assistant Advertising Manager.

Gentlemen:-

The picture your staff photographer took yesterday is of our new 2½ ton truck---a Douglas, made right here in Omaha.

We bought the Douglas, after investigating everything else on the market, because we believe that it is the best motor truck on the market today. We make this statement with no hesitancy, too.

In our work we need a truck that will stand the test first, last and all the time---one that we can always depend on to go anywhere at any time. We are especially pleased with the several units the Douglas people put into their job, for instance the Duda HU Motor, the Torqueson Axle and other features. These features together with the fact that it will satisfy the worst crank in truck drivers and MADE RIGHT HERE IN OMAHA where we can get immediate service on parts and repairs makes us believe we have made a big buy.

This is our second Douglas, too, in the past three months. You know we are satisfied. Its SOME truck and we'll buy another one as soon as we need it.

Very truly yours,
THE IGO EXPRESS

This Full Page Ad. Appeared in The Omaha Daily News, Oct. 5-19 It Tells a Big Story *Read It*

"THE BEST MOTOR TRUCK ON THE MARKET-"

SAYS ONE OF OMAHA'S LARGEST USERS OF TRUCKS

"IT'S SOME TRUCK AND WE'LL BUY ANOTHER ONE AS SOON AS WE NEED IT" - HE CONTINUES.

SUCH TESTIMONIALS FROM CONCERNS LIKE THE IGO EXPRESS COMPANY PROVE THE DURABILITY AS WELL AS THE SERVICEABILITY OF

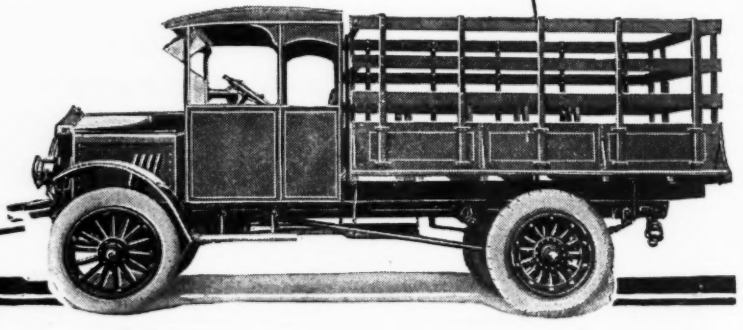
DOUGLAS TRUCKS

(MADE IN OMAHA)

IF YOU ARE CONSIDERING A MOTOR TRUCK OF ANY SIZE OR CARRYING CAPACITY YOU MUST CONSIDER WHAT SUCH USERS AS THE I-GO SAY.

WRITE US FOR OTHER TESTIMONIALS

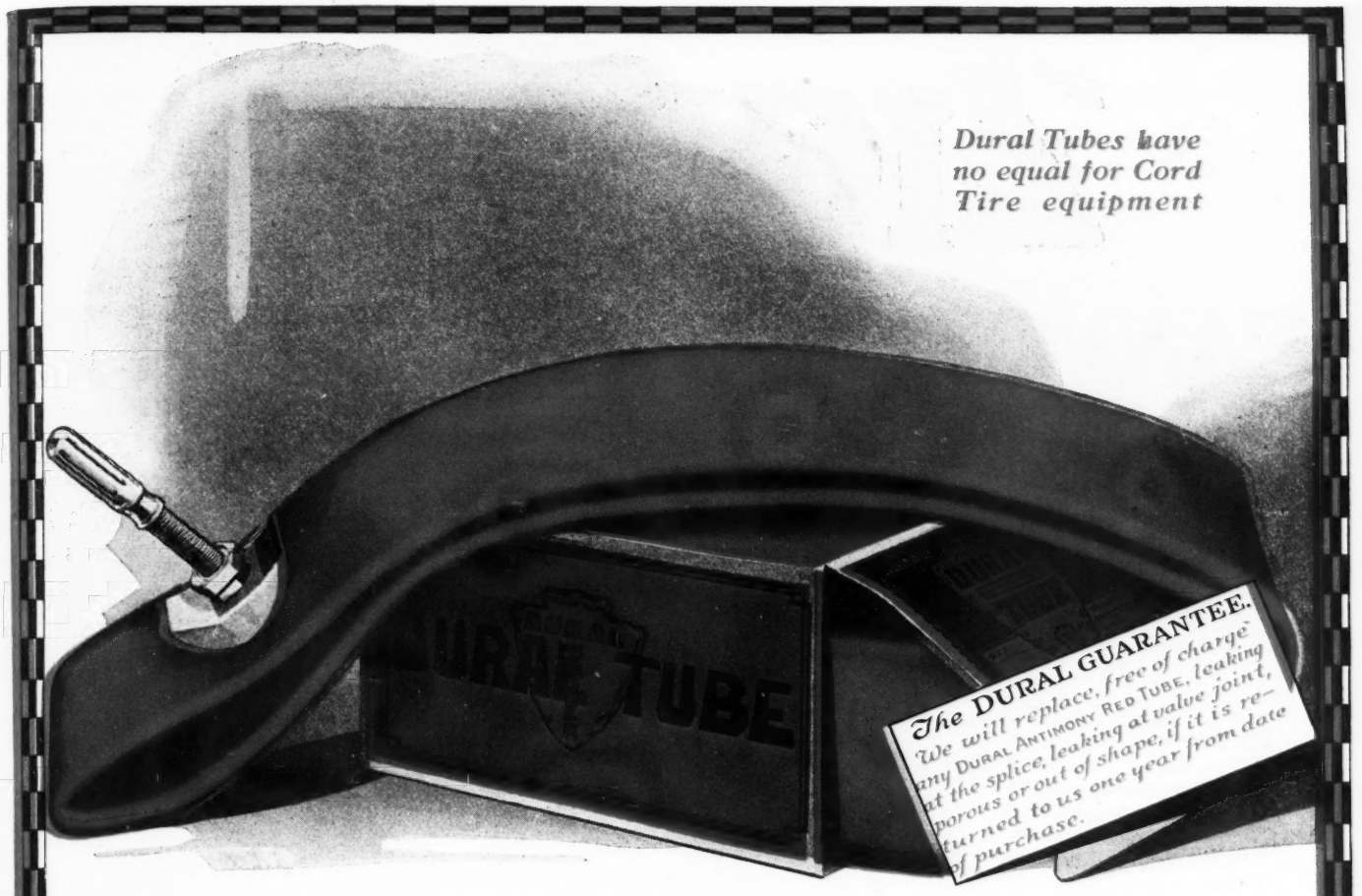
Here's Our Dealer Story



We are looking for a dealer in your town. We want a man who recognizes the big opportunities in selling the right kind of truck. We have designed and built a truck that has *made good*. It's not in the "try out" stage. *It has arrived!* It's a *real truck* in every sense of the word. It backs up every claim we make for it and we are making some pretty broad claims. The truck has shown what it's made of. It tackles a job and gets it done in a way that means money for its owner.

If you are the kind of man we are looking for, we want to know you. We want to explain our entire proposition. Get in touch with us by wire or letter.

DOUGLAS MOTORS CORP., 30th and Sprague Sts., OMAHA, NEB.



Your Guarantee Against Tube Leakage—
Have DURAL TUBES in Your Tires

More flat tires come from leaky tubes than from punctures. Leaky valve joints, porous rubber, leaky splicing—all are common causes of defective tubes.

But tube deflation disappears when you equip with Dural Tubes. They are guaranteed against it.

Laminated construction eliminates ordinary porosity.

Hermetical sealing to the valve and a special reinforcement of rubber impregnated duck prevents valve base leakage.

The splice is steam-cured—the expensive way but the sure way to prevent splice leakage.

Read the guarantee and then prove it for yourself by buying Dural Tubes. You'll get full-sized, extra thick tubes that give long life and thorough satisfaction. More—you'll get a tube with an extra overlap that is the best protection in the world against the most common cause of blow-outs—Pinching.

—and yet They Cost No More Than Ordinary Tubes

Write for the attractive Dural Dealer offer

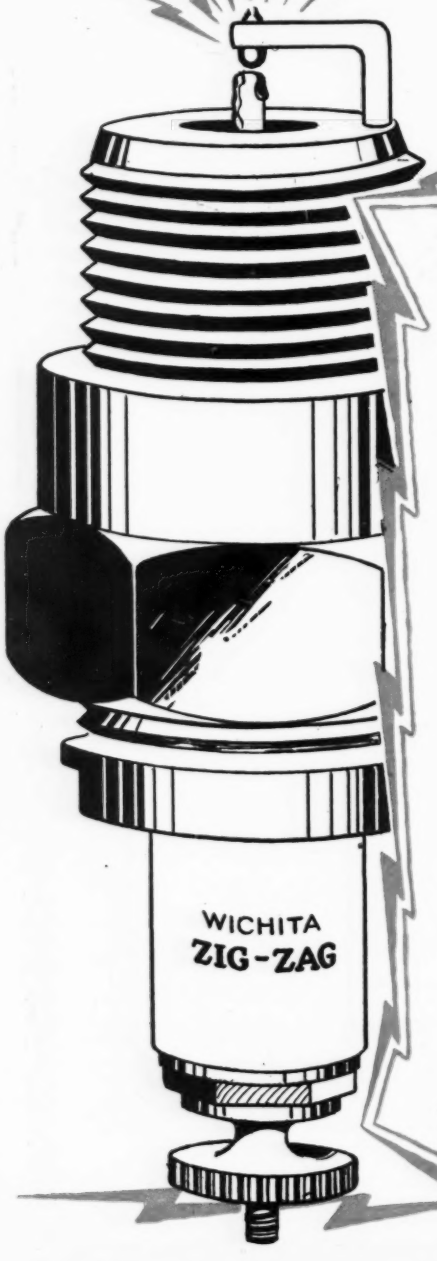
DURAL TRADE MARK RUBBER

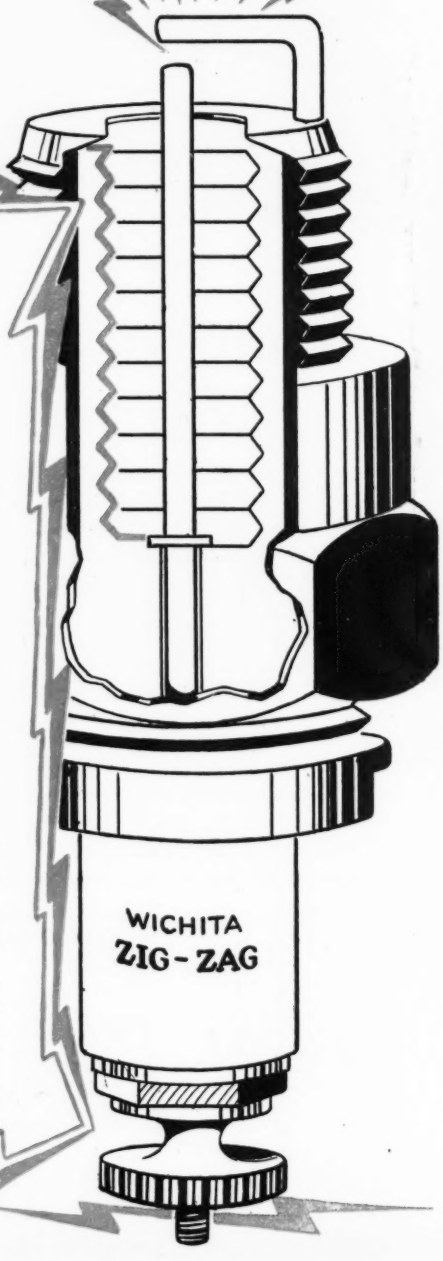
DURAL TUBES

DURAL RUBBER CORPORATION
FLEMINGTON, NEW JERSEY

A ZIG ZAG CANNOT SHORT CIRCUIT

WILL
SPARK
THROUGH
OIL OR CARBON





The Current Is Forced Through Its Proper Course

The Wichita Zig-Zag Spark Plug is an improved plug which will render effective service under conditions which cause other plugs to fail entirely.

The cause of spark plugs missing fire when fouled by oil or carbon, is that the **current finds an easier** route over the carbon surface which is gradually formed on the interior of the plug, making a short circuit.

To develop a short circuit, it will be observed that the only course of travel the current could take would be the path indicated by the red line, and the longer the distance the higher the electrical resistance. There is no other available path left in this plug except that which the current is intended to take, that is, through the air space in the gap between the points of the plug.

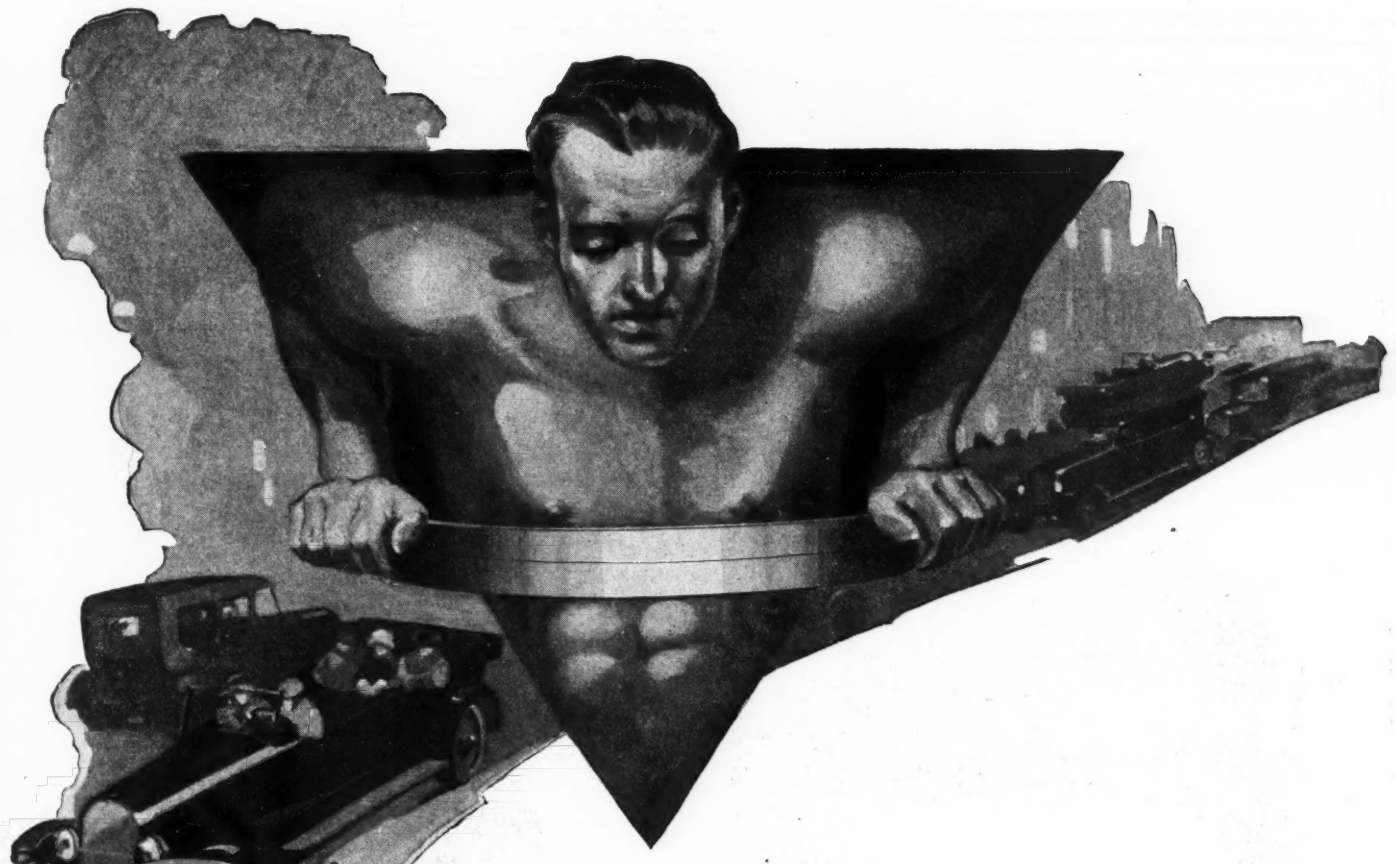
The peculiar zig-zag surface of the interior also helps greatly to keep the plug clean. The heat generated in the plug always travels to the edges of the grooves, just as it travels to the outer edges of the fins on air cooled motors, and thus the heat is radiated from the body of the porcelain, which keeps oil and carbon burned off and prevents breakage of porcelain body.

This plug will not foul if the motor is choked or loaded too much when starting in cold weather.

DEALERS: Do you want exclusive rights in your territory to sell a spark plug that motorists have longed for? A Spark Plug that you can honestly recommend and still share a greater profit.

Write for most liberal Spark Plug proposition ever offered

Wichita Zig-Zag Spark Plug Co.
Wichita Kansas





Cross Section of Ring
—Section pressing outward and upward.
—Spring section of ring.
—Lower outward and downward section.

Illustrating the Wedge Principle
The Wedge principle employed in the making of WedgeRite Piston Rings is shown in the accompanying drawing. Its superiority, measured by its ability to expand in WIDTH as well as in diameter, means utmost satisfaction for motorists. The repairman who uses WedgeRite Rings is one who can be trusted. By using the Best Piston Ring he shows a real desire to give you better repair service.

The Wedge Does It

Back of *WedgeRite Piston Rings* is a principle used for ages by woodmen in splitting giant trees. The advance agents of civilization know the value of the *wedge* and increase their efficiency by using it. In applying the *wedge principle* to the construction of piston rings we have solved one of the most troublesome problems facing the motorist. The *WedgeRite Piston Ring* is made up in three sections—two outer or bearing rings and a wedge-shaped ring of untempered spring steel. This spring steel ring is slightly larger than the two outer rings and when placed between them it exerts a constant outward pressure, wedging the outer rings apart and pressing them firmly against the groove walls. *WedgeRite Piston Rings* excel because of this exclusive feature.

Demand WedgeRite Piston Rings

When you have your engine overhauled be sure to instruct your repairman to install *WedgeRite Piston Rings.* The minute you get under way you will notice the difference. A new power—a smoother power will drive you over the road with maximum ease and minimum effort. Ask your repairman to show you the *WedgeRite Piston Ring* today. Get him to explain the principle of construction. Also note the quality of material used and the finish of each ring. *Or write to us for full information.*

More Power—Smoother Operation

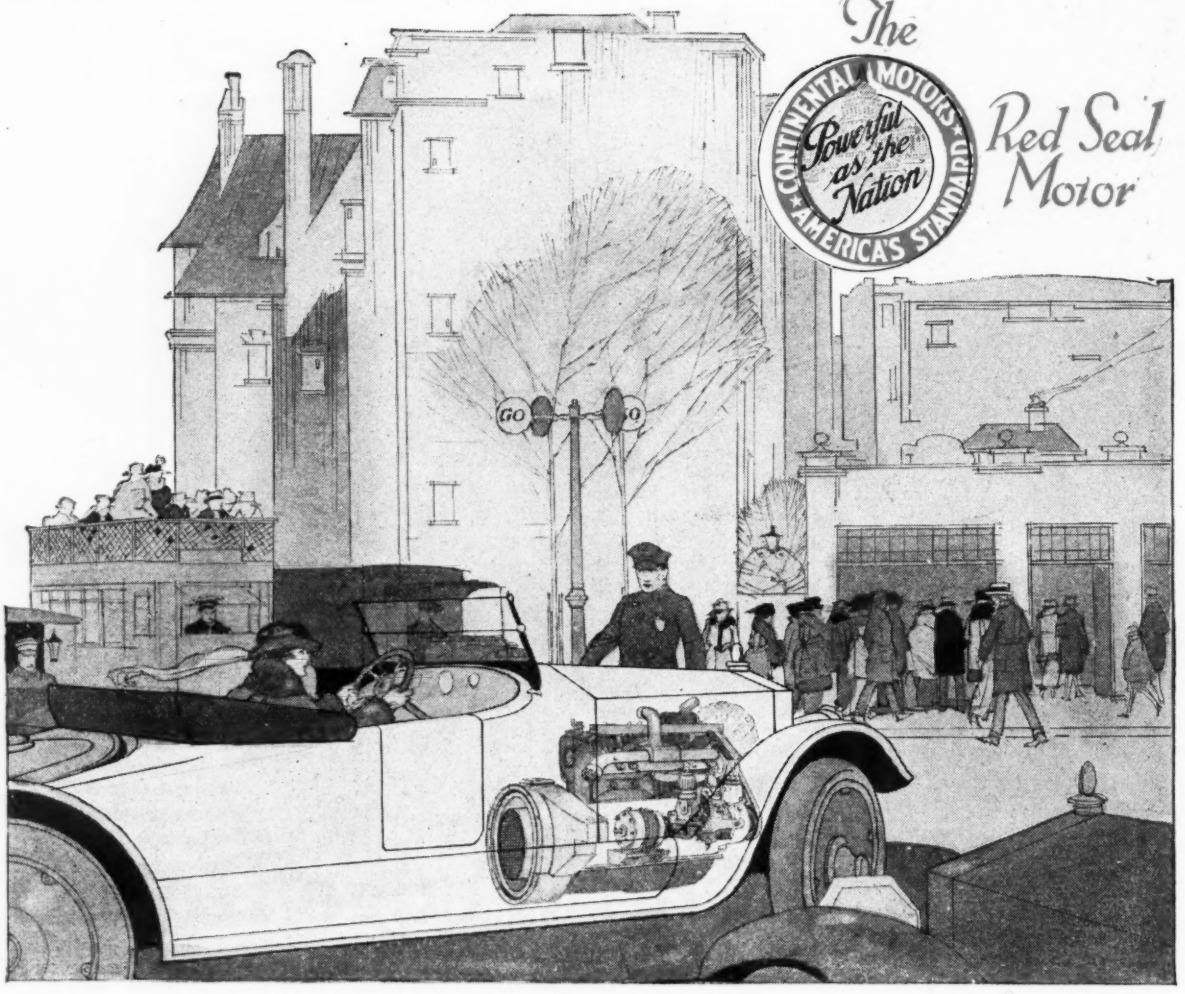
Dealers and Garage Men

The wise dealer or garage-man is using *WedgeRite Piston Rings* for all replacement jobs. They please customers and create good-will and prestige. Write us.

WedgeRite Piston Ring Co., Inc.

Plattsburg, New York **Montreal, Canada**

THE DEWITT G. SALTSMAN CO., New Haven, Conn.
NATIONAL AUTO SUPPLY CO., Chicago, Ill.
BEST DIST. COMPANY, Kansas City, Mo.
CRESSY BROS., 979 Woodward Ave., Detroit, Mich.
J. E. BENEDICT CO., 1212 Figueroa St., South, Los Angeles, Cal.



POWER THE INSTANT YOU NEED IT

There's a lot of satisfaction in driving a car you know you can depend upon.

What a comfortable feeling of security you have, in the tight places, when you know that you have *power*—abundant power—the instant you need it Satisfaction such as this comes only to the man who knows he has a *good* motor in his automobile or truck.

For the motor's the heart of the car. Upon its performance—its power, its speed, its economy, its all-'round ability—depends your satisfaction, your security, your pride of ownership.

Look *first*, then, to the motor when you buy a passenger or commercial car. Judge the motor by its record. Judge it by the test of time—by what it *has* done, by the kind of service it *has* given throughout the years.

Apply this test—and your choice will be the Red Seal Continental Motor.

The Red Seal Continental has stood the test of time, and service—during more than fifteen years. It represents nothing untried, nothing experimental. Rather, it represents the coordinated thought of the foremost motor engineers, for more than a generation.

It is a *proved certainty*. It is America's Standard.

* * * * * *

Today 165 successful manufacturers of automobiles and trucks, by equipping their output with the Red Seal Continental Motor, vouch for its integrity.

Upward of 16,000 dealers base their business prosperity, their business future, upon Continental-motored cars.

Hundreds of thousands of satisfied owners are living testimonials that the judgment of these manufacturers and dealers is *right*.

When you buy an automobile or truck, choose a motor with abundant power—power the instant you need it—and indentify it by the Continental Red Seal.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, Michigan. Factories: Muskegon-Detroit.

Largest Exclusive Motor Manufacturers in the World.

Continental Motors



The Jordan Third Reader

THIS book is called the Jordan Third Reader because it tells in simple words the story of Jordan progress since the Jordan Second Reader appeared.

Its purpose, frankly, is to help others to know what Jordan owners already know — how Jordan leadership has been attained.

The Carry-All Days Are Passing

Everyone knows that the carry-all days of bulk and extravagance in motor cars are passing.

The day of the handy, quick-about open car, and dominating enclosed type is here.

The world is ready for a really high-grade, compact, light-weight, good-looking, perfectly balanced, rattle-proof, comfortable, and economical motor car, with rare ability to perform, and built to serve the owner satisfactorily over a period of years.

Time was when we bought motor cars like graphophones, large enough to entertain the neighbors.

Now our friends have motor cars of their own.

Watch the endless line of motor cars moving down the boulevard.

Count the average number of passengers carried.

You will find the average to be really less than five.

Now and then, a motor buss comes along with a megaphone man, calling attention to the sights of interest.

Frequently a cheap car passes, carrying seven passengers and one or two dogs.

The most expensive cars—the aristocrats of motordom, commonly carry two and three and sometimes four or five people.

Occasionally we see seven people in a high-grade car, but they all look strangely uncomfortable.

Two Months Ahead of London

Just ahead of the London Show, and a step in advance of the Grand Palais display in Paris, Jordan presents the New Silhouette Five—the American Ace of Light Cars.

It is a brawny, alert companion for those custom style leaders, which have made dominant the Jordan good name.

The essential characteristic of this car is quality—quality unstinted and sustained. For that is the recognized Jordan ideal.

Styles Travel with the Sun

Styles travel from East to West with the sun. That which Europe

approves today, Fifth Avenue accepts tomorrow, and it becomes country-wide vogue on the following day.

Here is a car, high-grade, light in weight, good-looking, perfectly balanced, rattle-proof, comfortable, economical, and striking in performance, that will stay put.

It is a car for the experienced owner who has acquired a sense of real motor car value.

A New Dynamic Power Unit

This car includes a new dynamic, light bundle of energy, which marks the passing of the days of bulk and burden in open and closed cars driven regretfully by people who love snap.

A new motor—designed and built exactly to suit such an ideal car, was necessary—of course.

A Six Cylinder—Assuredly

It is a Six, assuredly, because that is the world trend of motor design.

The twelve with $2\frac{9}{10}\%$—the eight with $11\frac{7}{10}\%$—the four with $29\frac{5}{10}\%$, are on the descending scale of American and foreign production.

While the Six, with $55\frac{86}{100}\%$ of the total produced in this country, is on the rapidly ascending scale here and abroad.

The answer is simple.

The Six furnishes the greatest power for its weight and simplicity, with the least vibration.

In this motor, the forces of vibration go down in defeat.

No pen or tongue can describe the breathless charm, akin to pain, that possesses a man in his first flight in a flying boat.

No more can we picture that indescribable something which makes men old in this business, love to drive and drive this car. The effect of body squeaks and rattles upon the human nerves is striking. Like motor vibration, they rasp the temper.

You finally reach the point where you have to slow down or stop altogether. In the new Silhouette bodies, everything that body experts have learned has been done to attain gratifying quiet.

With such a motor car you may drive as fast as you dare, and you ex-

perience the sensation of driving within the law.

Sit all day at the wheel and you return without fatigue, ready to go again.

The Experienced Owner's Car

Consider, if you will, how one millon experienced owners would vote on every detail of their ideal car if they had the power to do so.

Think, if you can, how few would vote for this feature, or that feature, but how many would vote for those dominant features which characterize the best average product of man's hands and brain.

How little opportunity would the freak designer or the man who tries to revolutionize the industry, have in a crowd like that!

Every feature—every detail of this car—was determined after an exhaustive study of all cars built in America and abroad.

We are building for a world reputation and we know it.

Balance the Dominant Thing

Balance is the dominant characteristic of Jordan cars. This depends upon the careful distribution of weight, the length and quality of the springs, the delicate point of their suspension, and the arrangement of the steering apparatus.

Jordan bodies are hammock-swung between the axles, with long springs—of chrome vanadium steel.

When a cheap carbon steel spring is over-stressed, it reaches its elastic limit, and rapidly goes to pieces.

Perfectly balanced with ideal chassis proportions and no body overhang, the whole tendency is toward forward motion with no ruinous side-sway.

That explains Jordan service, even with abuse. Imagine a car like this. Picture it as it is—full of life—muscular and alert. It runs like a spirited horse. No jerky up and down motion so characteristic of extremely light cars of short wheel base.

No surplus side-sway, almost invariably found in extremely heavy cars.

Men who are weary of big bulky cars will choose it with joy.

Comfort Europeans Know

Step into the new Jordan and you will experience a rare sensation.

The body sides are deep—but not high because the cushions on Marshall springs are extremely deep and rest almost on the floor.

You sink down at a perfect comfort angle, conscious of no effort—no need to brace yourself to keep from sliding forward or sideways.

The soft, hand-buffed leather, bright with quaint lustre and narrow French pleats, wells up around you.

The arm rest is in just the right position.

Your knees are not too high. You feel that satisfying sense of lounging, for you ride in the car and not on top of it.

People Demand Light Weight

The greatest objection to cars which compare with the Jordan in quality of materials, is the fact that they greatly exceed the Jordan in weight and price, and suffer when compared in terms of beauty, lowness, comfort and balance.

The new Jordan is the lightest motor car on the road for its wheel base.

Thousands of owners now know that it possesses a peculiar quality of balance which cannot be attained in cars weighing 1200 to 1500 pounds more, nor is it possible in an extremely light car of short wheel base.

The ratio between the weights of the front and rear is so delicately fixed, and the relation between the sprung and the unsprung weight is so near correct, that you avoid that disagreeable side-sway which characterizes heavy cars which, to carry the extra weight on the springs, must be hung high in the air.

There is a point between extreme weight and extreme lightness which can be attained only through proper distribution of weight and the use of long, all vanadium springs.

Jordan engineers have so delicately determined the position of the steering apparatus and the point of spring suspension that the whole tendency of the car is toward forward movement, thus eliminating the racking side-sway which is so expensive in upkeep and tire maintenance.

An extremely light car of short wheel base vibrates up and down, while the extremely heavy car of short wheel base, considering its weight, cannot escape the wear and tear produced by side-sway.

Sturdy and Substantial

The new Jordan possesses the same sturdy and substantial appearance of the finest heavy cars with the beautiful contour, lightness, lowness and balanced character of the trim, thoroughbred racing job.

People are demanding lighter, well balanced cars—but not too light.

The Jordan Silhouette Five weighs only 2800 pounds.

Velvet Spring Shackles

A wonderful improvement is in the introduction of a patented spring device eliminating that annoying rattle common to all cars. Besides the shock produced by spring side-sway has disappeared.

Every part of the chassis possesses a factor of safety which is sufficient to more than meet every possible strain, but yet not so extreme as to make the car bulky and of excessive weight.

Russell Begg, the Jordan chief engineer, has realized that in this chassis the highest ideals which he has maintained for the car since it was first designed and produced, and never changed except in point of details, as these have been developed by constant study and experience.

A Woman's Appreciation

Women, with a natural appreciation for comfort, atmosphere and poise, will find this car irresistible in its compelling colors and fashion, comfortable to a delightful degree.

The new Jordan Silhouette bodies, as the well-informed already know, have been accepted as models by those who do not hesitate to follow intelligent leadership. In exquisite contour, warm colors and studied detail in workmanship, they have marked the passing of the old and the advent of the new.

In the broad seats you sink down at a perfect comfort angle, conscious of no effort—no need to brace yourself to keep from sliding forward or sideways. There is a little more clearance under the steering wheel, affording that low-sitting, graceful attitude, so desired by those who value motor car poise.

The Silhouette Sedan

This striking little car marks the advent of the new light weight, four-door Sedan, compact in capacity, European in lowness, square cornered, and a little bit of what Friend England calls "nippy."

The lines are square. Body hangs low.

You step easily from the curb through broad doors into the inviting interior.

The light aluminum body is virtually dust and rattle-proof, with broad vision.

The upholstery is of the finest imported character in shades to match the body colors—the mouldings and hardware in delicate and beautiful designs.

The Jordan Silhouette Brougham

This remarkably popular type acquires new grace with new lines.

Square corners, with the same spacious comfort, intimacy and cleanliness, with full protection from the weather, which has characterized Jordan closed cars from the beginning.

The windshield is sloping—the solid, lower section completely weatherproof.

The Jordan Playboy

The Jordan Playboy is built in limited numbers for robust Americans who refuse to grow old.

Designed at first for those who, being young, love life—and their days move snail-like—it has been happily sought by those who, being older, love youth—and their days move fast.

This is a car for beckoning hills and open roads alluring.

A vigorous and friendly companion to those who having traveled, love to travel more.

Who knows what marvel the next winding highway may reveal?

The motor car pays dividends of unmeasured joy and good health to those brave enough to be happy.

The Playboy dominates the open road. Full of life and color—sturdy with admirable strength, it thrills that happy man who has learned to throw away dull care, beckon someone for whom he cares and has the imagination to say—

"Come on—Let's go somewhere."

The Pride of Jordan Men

Jordan cars are built by men who love their work and express pride in its execution.

The personality of this motor car which has brought nationl recognition, cannot be defined in terms of mechanical units.

No single attribute of quality can explain its dominating appeal.

Better say that it possesses a certain kind of honest goodness which enables it to serve adequately in a practical way, those admirable people who can never be happy with commonplace things.

Color and grace give it rare distinction among the mass.

Comfort in a gratifying degree makes it the chosen car of those who love comfort.

It is quiet—as a car of character should be—and it carries with it an atmosphere which is quite in keeping with that good taste in every detail which the name of Jordan instantly suggests.

Dominant Jordan Features

A Chassis including all the finest, universally approved mechanical units—the lightest on the road for its wheel base—possessing that peculiar balance not possible in cars of excessive weight.

Patented spring device eliminating the annoying rattle common to most cars.

Hand-buffed, narrow-pleated French leather. Marshall cushion springs. European type tilted cushions, soft and deep.

All aluminum body—no rumbles, ripples or rust.

Broad doors, describing a complete semi-circle when open.

Fashionable, French type outside hinges.

Delightful position at wheel, with restful tilt and pedals just right.

Lamps attractively mounted inside front fenders, eliminating rattles and providing substantial support.

Instrument board finished in gun metal to eliminate squeaking and paint checking, set with instruments beautifully nickeled.

Top tailored and fitted with broad plate glass rear vision light.

Hardware substantial and artistic.

Discriminating demand is toward finest cord tires for service and appearance. Cord tires have practically eliminated tire trouble.

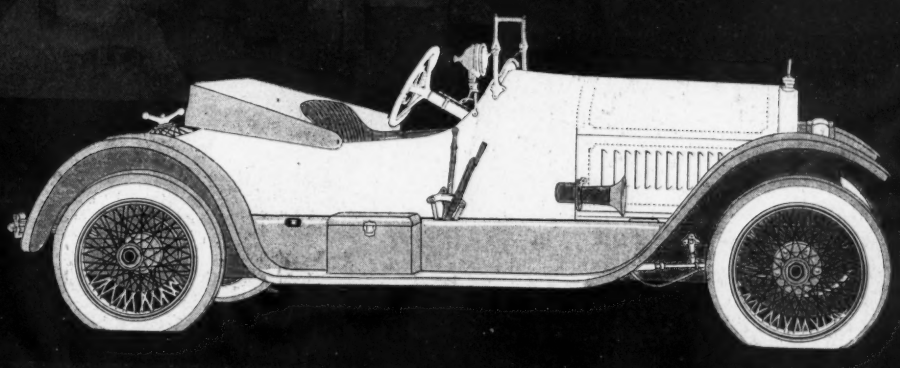
Standard equipment all Jordan models, Goodyear Cord.

Artillery wheels, sturdy and finished in harmonious colors, standard equipment.

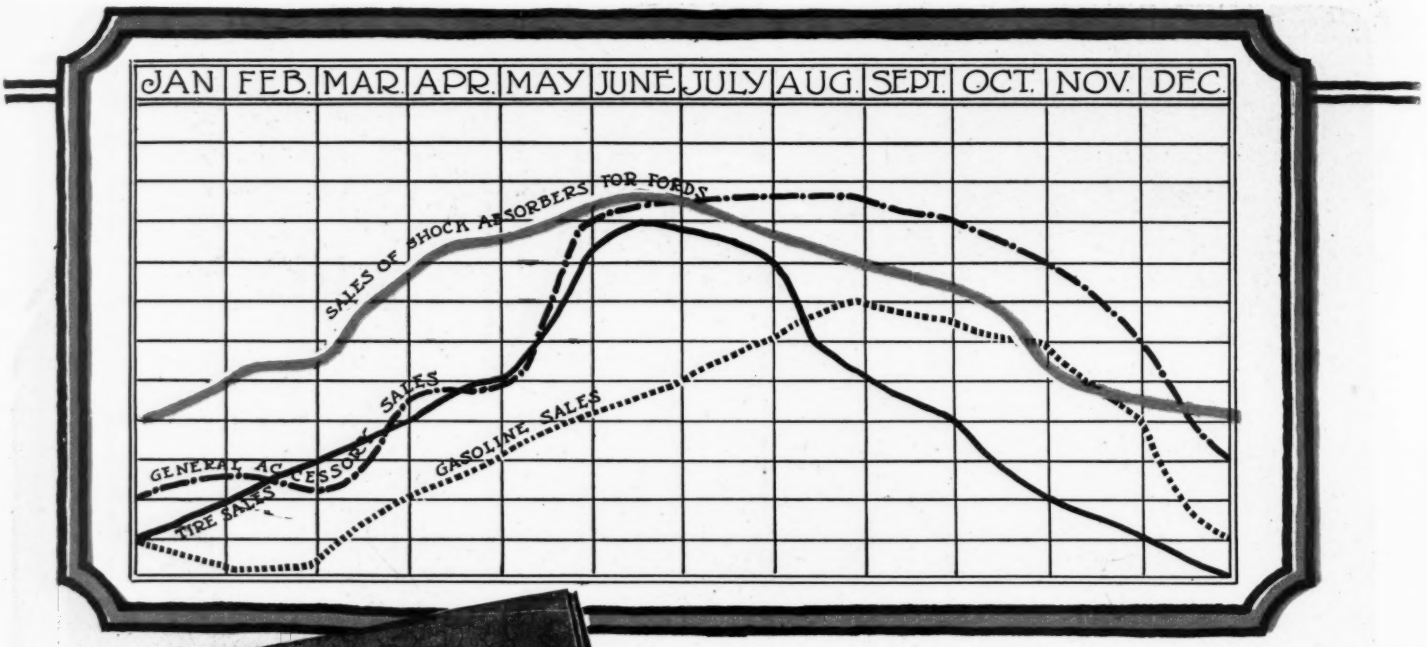
JORDAN MOTOR CAR COMPANY, CLEVELAND, OHIO

THE CORDAY & GROSS COMPANY, CLEVELAND

INDIANAPOLIS
STUTZ
INDIANA, U.S.A.



The Car That Made Good in a Day

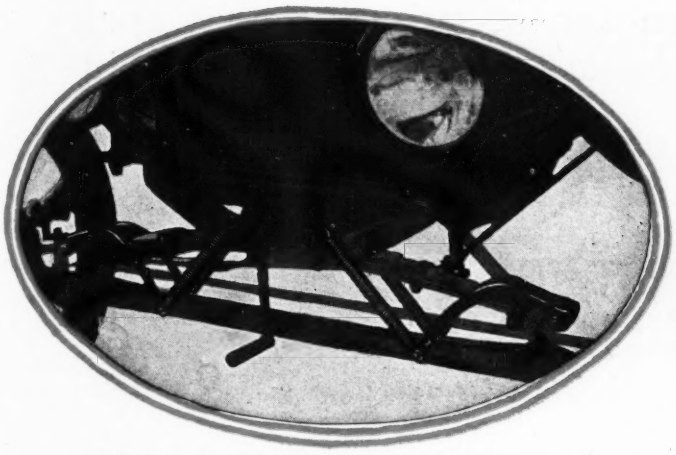


If after 30 days your customer is dissatisfied with H & D Shock Absorbers, he may return them and have his money refunded. We will send you a new set and our check for $3 to pay you for the trouble.



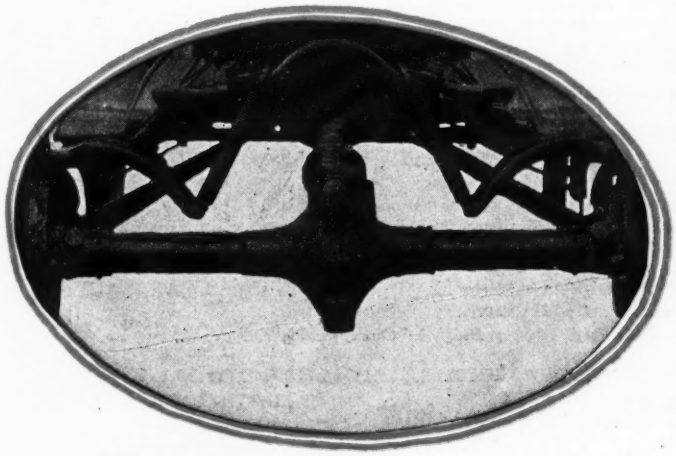
H & D COMPANY.

H&D Shock Absorbers
Sell The Whole Year Round



H & D Shock Absorbers installed on a Ford passenger car

H & D Shock Absorbers installed on a Ford Commercial car



Most accessories and supplies meet a sales slump sometime during the year. In winter particularly, the demand for practically every type of motor car accessory takes a sharp drop.

One exception stands out, clear and strong. Sales charts covering towns and sections in every part of the country prove conclusively that shock absorbers for Ford cars are the exception.

The decrease in the number of Fords driven in the winter is balanced by the increased demand for shock absorbers occasioned by bad roads and rough going. Assuming that four out of ten Fords are equipped with shock absorbers in the summer, then six out of ten should be so equipped in the winter. That's what keeps the shock absorber sales curve pretty even the year around.

When the dealer has recognized this very important point, and has realized how it effects his winter profits, there remains no reason why he should not stock, *at once*, H & D Shock Absorbers.

For you, H & D's will mean a bigger business—a steady, constant and profitable business this winter. Place your order with your favorite jobber.

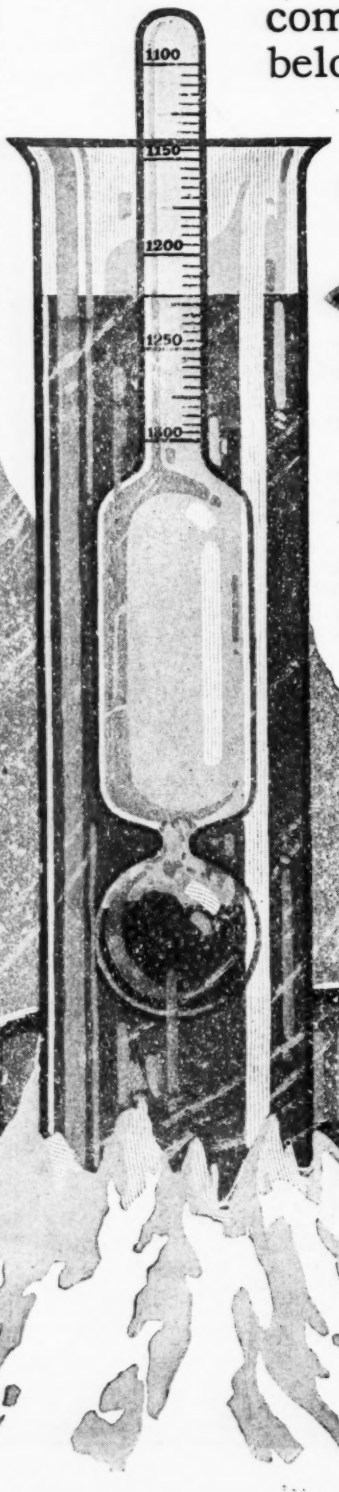
IN CANADA:
RICHARDS-WILCOX
CANADIAN CO., Ltd.
London, Ont.

H&D
SHOCK ABSORBERS
"Single *or* Twin Arm"

GOODLAND, Indiana

Be Safe—Use a Non-Freeze You Can Test

Replace the water in your radiator with Norwesco "TWELVE-TWENTY." You can test it with an ordinary battery hydrometer, so when a cold spell comes you'll *know* you're protected to 20° below zero.



NORWESCO
The Chemically Correct Line

TWELVE-TWENTY

comes ready to use. No measuring. No dissolving. Just pour it into the empty radiator.

Certainty supplants guesswork. Many of the 100,000 radiators that froze last Winter were owned by men who *guessed* they were amply protected.

Comes Ready to Use—No Mixing

Norwesco chemists will have mixed your solution in chemically correct proportions. It will have a specific gravity of 1220. Just pour it in. Then test it occasionally. You have no mixing, no dissolving, no measuring to do.

Less Leakage—Less Evaporation

With a boiling point 12° higher than water, it evaporates much more slowly. And it warms the engine quickly—less "popping" on a cold day. "TWELVE-TWENTY" will not "find" leaks like ordinary anti-freeze solutions. Its tendency, on the contrary, is to keep the cooling system fluid-tight, clean and efficient.

Remember, all non-freeze solutions contain water. And water evaporates when heated, causing changes in the solution.

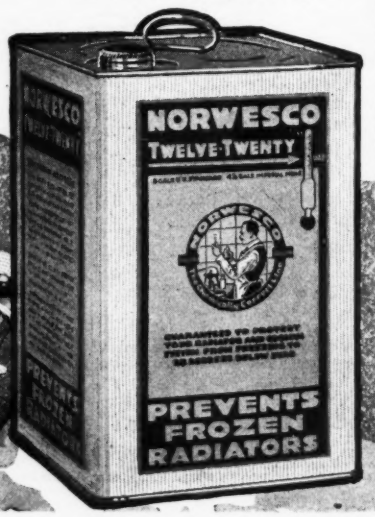
You can *test* "TWELVE-TWENTY" and *know* its strength. You have to *guess* at others.

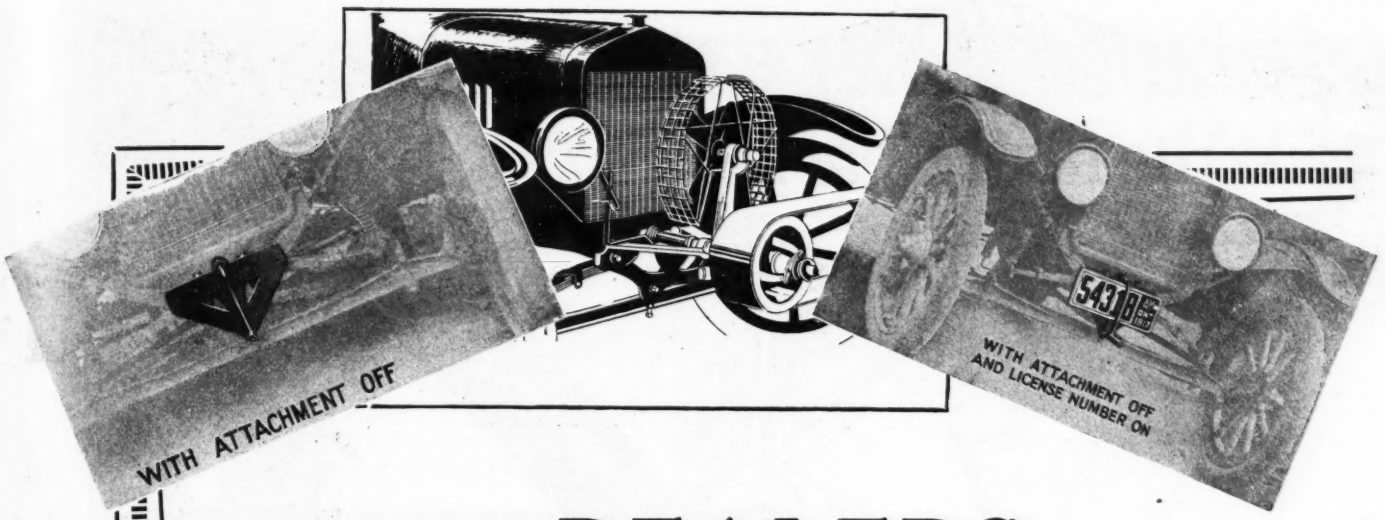
"TWELVE-TWENTY" is made by the creators of SE-MENT-OL, the radiator cement with a million users, SKALEX, the radiator cleaner, and the rest of the "Chemically Correct" Norwesco Line. Probably your dealer handles it. Comes in 1-gallon cans, $1.25; 3-gallon cans $3.45 and 5-gallon cans $5.00. (20c additional per gallon west of Rocky Mts.) Get a can now and be safe all winter.

Write for free 20-page Booklet—"Care of the Cooling System."

The Northwestern Chemical Company
511 State Street MARIETTA, OHIO, U. S. A.

DEALERS—Write for our proposition.





DEALERS FARMERS

Here Is PAYING Power For the Farm

Off Or On In 3 Minutes After the First Installation. Won't Disfigure the Car.

McGill AUTOPOWER ATTACHMENT FULLY GUARANTEED FOR Ford CARS

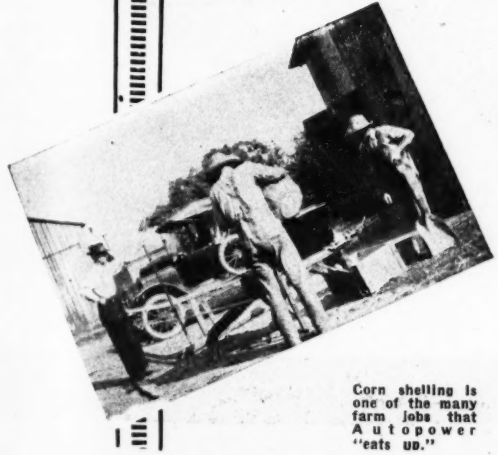
Plus a Ford It Costs Less Than a 14 h. p. Portable Gasoline Engine Costs Alone.



Pumping out a 30x32 feet well at Wooster, O.



Ensilage cutting—a job that demonstrates the sturdy qualities of Autopower.



Corn shelling is one of the many farm jobs that Autopower "eats up."

Boosts Profits Every Way You Look At It

Power on the farm—right handy—where it can be used at any minute and as long as necessary, is the big requirement of every farmer of the present day.

More work accomplished—with less help—brings profits up to the level farmers set.

The mechanical device that makes these profits possible, interests every farmer. Its low cost and high productive value make that interest grow.

The McGILL AUTOPOWER attachment for Ford cars does the work of a 14 h.p. portable gasoline engine—and at its price "throws in a Ford car free." Plus a Ford car it costs less than a 14 h.p. gasoline engine costs alone. For the farmer who already owns a Ford, it pays for itself on its first big job.

Here Is What It Does

McGILL AUTOPOWER will satisfactorily operate at required speeds, such machines as Ensilage Cutters (any make), Corn Huskers, Feed Grinders, Corn Shellers, Wood Saws, Pumps (all kinds), Hay Presses, Root Pulpers, Fanning Mills, Roller Grinders, Concrete Mixers, Road Crushers, Cider Presses, Churns, Washing Machines, Milking Machines, etc. Power taken direct from crankshaft. Equipped with automatic governor, friction clutch, and auxiliary fan.

It is the greatest labor saver for the farmer yet devised.

Dealers—the biggest seller you can hope for.

Farmers—the greatest labor saver you can find.

Knight Metal Products Co.
259 East Willis Ave.,
Detroit, Mich.

Mail the Coupon Now

For Free Illustrated Literature and Details

Knight Metal Products Co.,
259 East Willis Ave., Detroit, Mich.

Gentlemen:

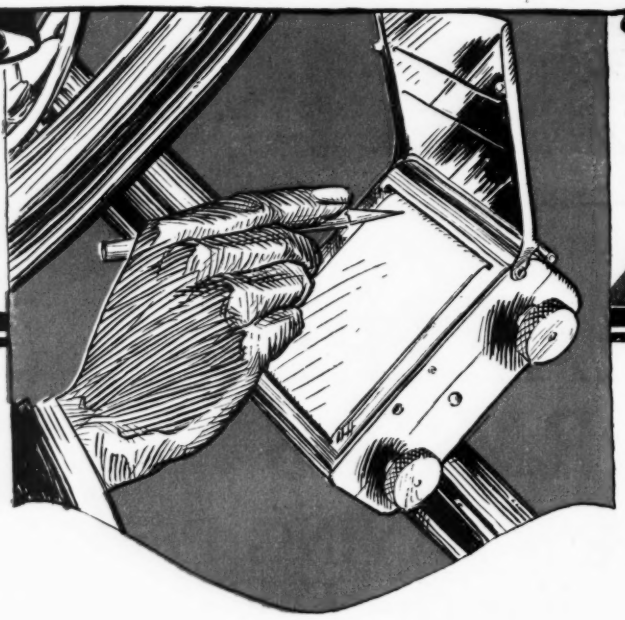
Send me immediately complete information and free illustrated literature concerning McGILL AUTOPOWER attachment for Ford cars.

Name .....

Address .....

Farmers check here []
Dealers check here []

"Write under Your Nose"





Well!

Do you know the roads down that way are good? Or should you make a detour? Have you got it on your Auto Memo Pad? Or must you use a flapping road map or repeatedly thumb your Blue Book pages?

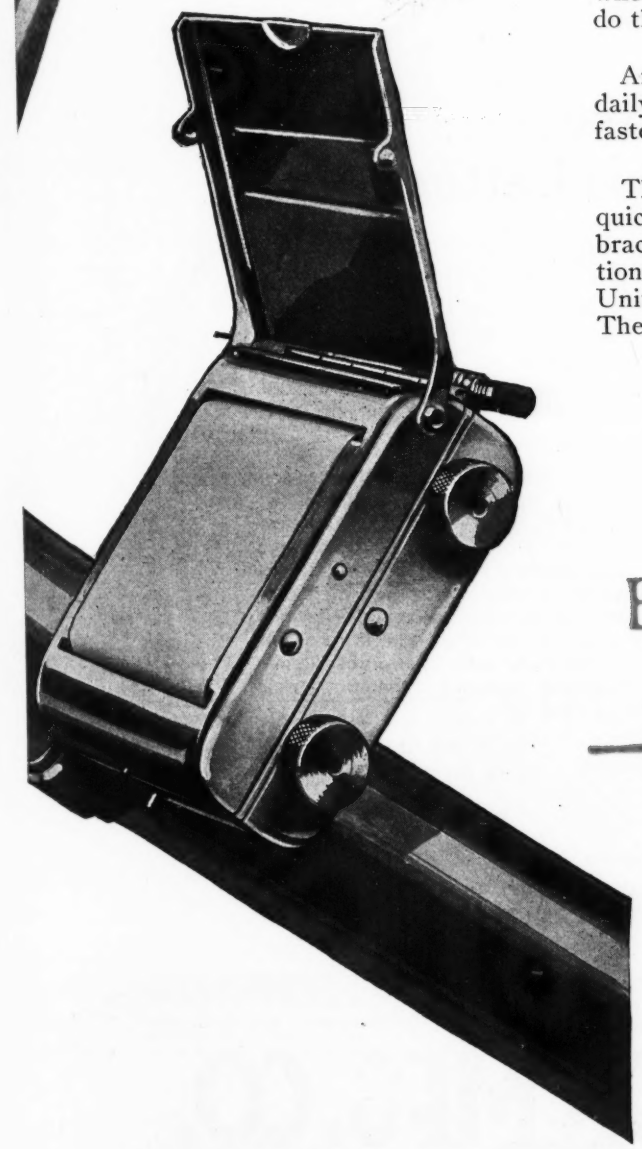
Don't Put It Off—Put It On!

The road that tore your tires—you don't want to ride it again—or hit that sandy stretch that held you back last time?

There are a hundred things you'll need to recall whether touring or out on business. Make a note of them before you start and refer easily to them as you go—by using Bell's Auto-Memo. Don't trust to memory; write it—put it down where you won't—where you can't forget it.

There are bad spots in every mapped trip. Mud holes, sand pockets, wash-outs, cranky turns and crankier rural police—mark 'em; write 'em in your Bell's Auto Memo and the next time you are down that way you know which road to go and how fast.

PRICE
$5.00



Then, too, you need to keep tabs on gas, oil, tires; record witness in case of accident, note appointments—the time and with whom and—well, there's hardly anything you do or intend to do that is not best recorded in writing.

And the only safe, sane, "can't lose it" way of recording your daily doings and goings is the little Bell's Auto Memo that fastens just under the steering wheel on to the steering post.

This accessory is aluminum—looks good and is good. It sells quickly and adds to the appearance of any car. Made with brackets to fit on cowl or steering post. The advertising publications and direct mail will reach 6,000,000 car owners in the United States. It's to be equipment on high-priced cars in 1920. The retail price is $5.00.

Bell's Auto Memo Company
Lyric Building Richmond, Va.

BELL'S "Auto Memo"
TRADE MARK REGISTERED

DEALERS: The discounts to dealers are generous. Write us—We want to tell you how we plan to help you make record sales with Bell's Auto Mo.



BOUGHT BECAUSE IT PROVED ITS CLAIMS

Read this Letter

The FLORIDA CITRUS FRUIT GROWERS ASSOCIATION has adopted officially the OSHKOSH Four-Wheel Drive Truck for its members. The selection was made after a competitive test, conducted by the association, in which nearly every big manufacturer of two-ton trucks in the country was represented. The test lasted two days and was made with sealed hoods—measured gas, oil and water—and capacity loads.

The following letter, dated September 30, 1919, from the purchasing department of the association — EXCHANGE SUPPLY COMPANY, W. F. Miller, Manager, tells why the 'OSHKOSH' won—on actual performance:

"After a most thorough test of the 'OSHKOSH' truck for both grove and road work in this state we have concluded that the 'OSHKOSH' proved to our satisfaction to be best for the purpose of our members.

"The 'OSHKOSH' showed a general adaptability and balance of power that was very satisfactory—proving that it could enter and leave over and through the most difficult soil conditions—in its road work it gave practical demonstration of the very great advantage that a four-wheel drive has under unfavorable road conditions—it required a smaller expenditure of power to pull its load—avoids the tendency of the front wheels to dig in and push the loose sand in front of them—also relieves the tendency of the rear wheels to spin and dig in."

W. F. MILLER, Mgr.,
by R. A. Ellis.

There are a few profitable territories open. Write immediately for information. What the "OSHKOSH" did in Florida it will do anywhere for any dealer.

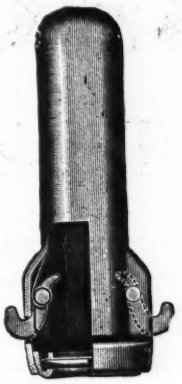
OSHKOSH TRUCK MFG. CO.

OSHKOSH WISCONSIN

ORNAMENTAL
and
USEFUL

Schrader Universal Quick Acting Dust Caps (No. 3199) on your car will not only spruce it up and give it an air of refinement, but will add to your comfort and satisfaction, because of the ease with which they are put on and taken off.

You simply slip the cap over the valve-stem as you would put a thimble over your thumb, and, presto, it is on, locked securely to the valve-thread by two steel teeth on either side.



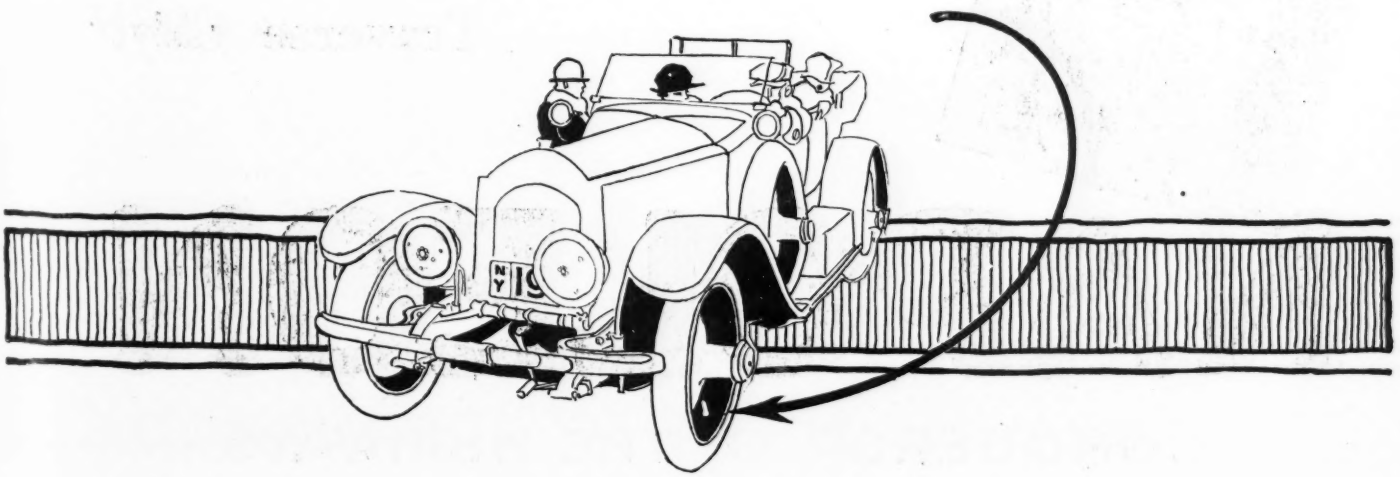
Patented Nov. 23, 1915.
April 29, 1919.

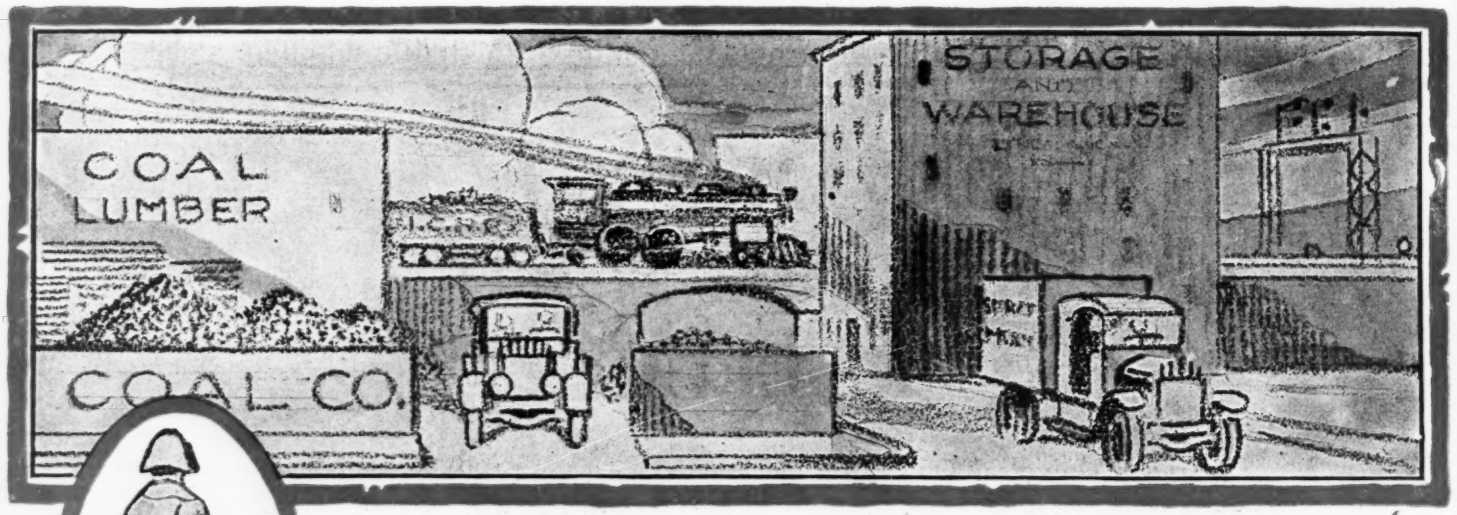
To detach, just press the two small levers at the side inwardly and the cap is instantly disengaged. Price 50 cts. $2.50 per set of five.

At your dealer's, or

A. SCHRADER'S SON, INC.
Brooklyn, N. Y.

SCHRADER UNIVERSAL
Quick Acting Dust Caps







1-Ton Chassis
Solid Tire Equipped
$1385

Pneumatic Tire Equipped
$1550

NAPOLEON

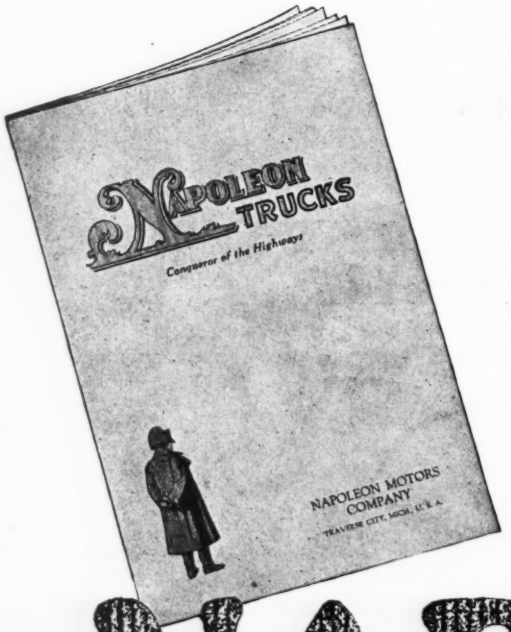
Napoleon Trucks Sell Themselves

The correctness of the design, the sturdiness of construction—and the striking appearance of a good looking job, appeal readily to the prospective user.

NAPOLEON parts are nationally advertised, and known to ninety per cent of the buying public.

This feature alone reduces selling resistance to a minimum—the big reason why NAPOLEON dealers are so prosperous.

Is it any wonder that they wire, telephone, write and come direct for territory selling assignments?

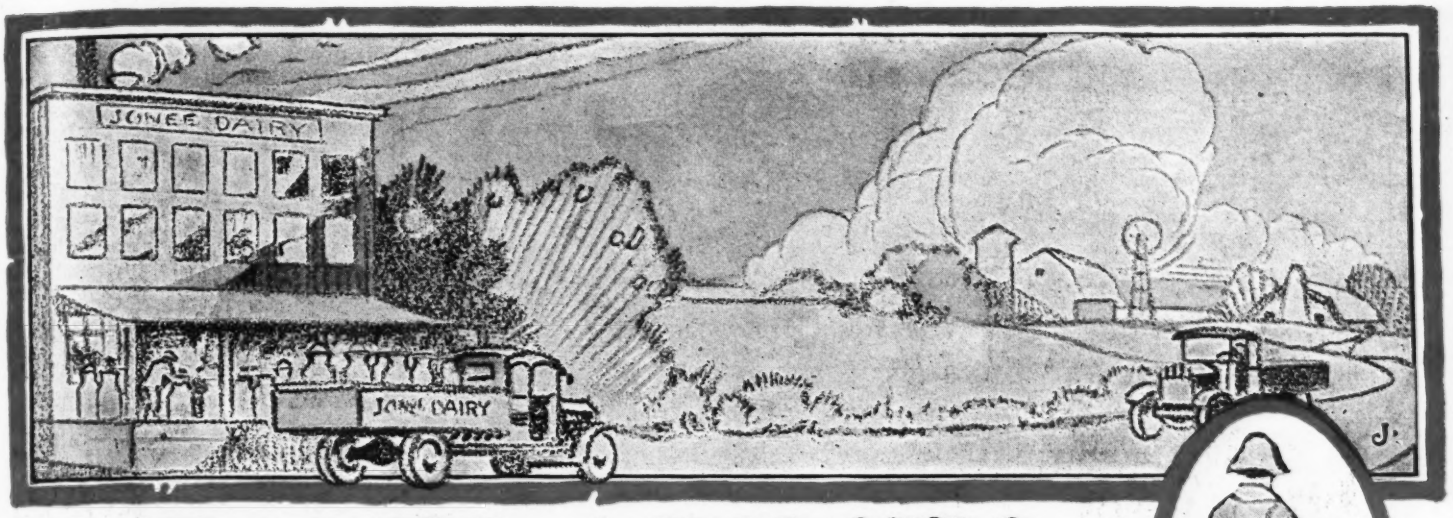


NAPOLEON

Traverse City,

NAPOLEON

CONQUEROR OF THE HIGHWAYS



SALES-ABILITY



1½-Ton Chassis
Solid Tire Equipped
$1660

Pneumatic Tire Equipped
$1860

For instance, to study the NAPOLEON more closely, consider the highly developed valve-in-head motor, a "Niagara" for power. And how could any truck manufacturer improve on the Clark internal gear drive axle—the Fuller transmission, and clutch—Connecticut ignition—Willard storage battery—Electric Auto-lite generator—and electric head and tail lights?

A single glance at the NAPOLEON double reinforced frame, the Chicago (army type) radiator swinging on vanadium cantilever steel springs, and a dozen other up-to-the-minute improvements are self-convincing evidence of NAPOLEON completeness and superiority. Really, this is a wonderful truck job—a truck backed by a real organization—a proposition that any high-grade dealer can profit by—extraordinarily.

COUPON

Napoleon Motors Co.,
Traverse City, Michigan.

Gentlemen:
Forward specifications and full particulars describing every detail of the Napoleon Truck—and the Napoleon selling plan for dealers.

Name .....

Address .....

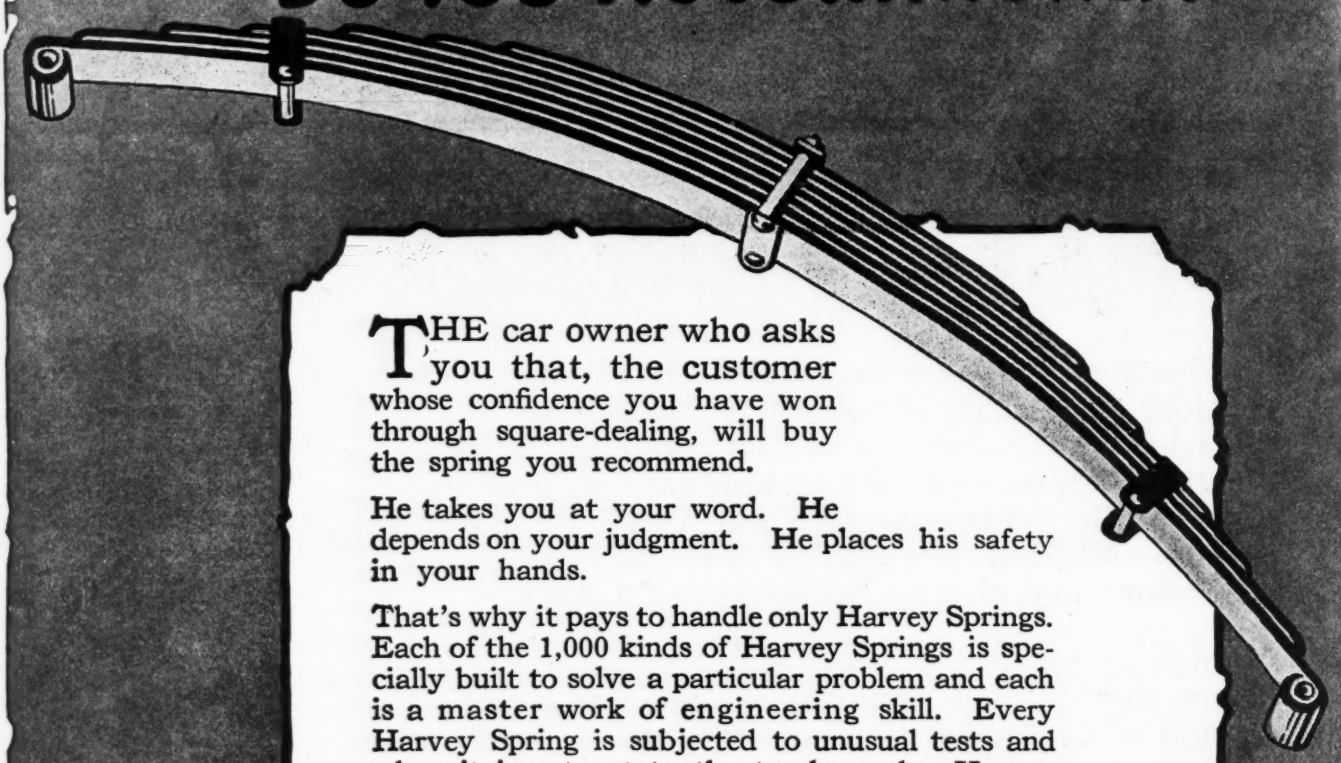
.....

MOTORS CO.
Michigan

TRUCKS

CONQUEROR OF THE HIGHWAYS

WHICH SPRING
Do You Recommend?



THE car owner who asks you that, the customer whose confidence you have won through square-dealing, will buy the spring you recommend.

He takes you at your word. He depends on your judgment. He places his safety in your hands.

That's why it pays to handle only Harvey Springs. Each of the 1,000 kinds of Harvey Springs is specially built to solve a particular problem and each is a master work of engineering skill. Every Harvey Spring is subjected to unusual tests and when it is put out to the trade under Harvey guarantee it can be depended upon. The Harvey standard backs up the dealer's recommendation with unfailing service.

Write for the Harvey Book containing specifications of springs for all cars.

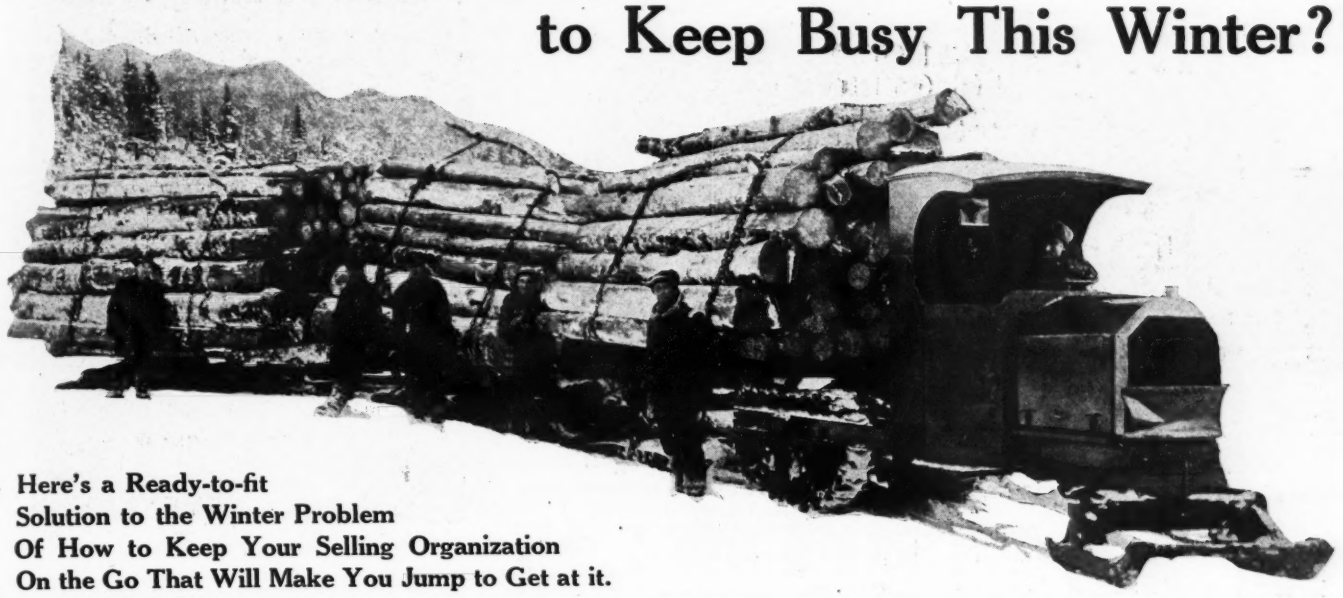
Harvey dealers are well equipped with sales helps, movie slides, window decalcomanias and inside wall posters as well as the helpful Harvey Book.

The Harvey Spring & Forging Co.
100 B 17th Street RACINE, WIS.

Easy Riding Guaranteed

Harvey RACINE SPRINGS

Why Worry About How to Keep Busy This Winter?



Here's a Ready-to-fit Solution to the Winter Problem Of How to Keep Your Selling Organization On the Go That Will Make You Jump to Get at it.

The amazing ground covering capacity of the war tank captured our imagination.

Picture its application—not as a **rigid** but as a **flexible** traction member to the motor truck—with a separate steering unit to save braking its power in turning.

Put in a Continental Red Seal Motor where it looks natural—add a Bosch magneto, Schebler carburetor, four speed Brown-Lipe transmission and Brown-Lipe-Chapin differential for good measure of standard equipment.

Send it out into the wilderness, through mud and snow, over soft ground and rough trails or put it to work upon a farm of 500 acres or over.

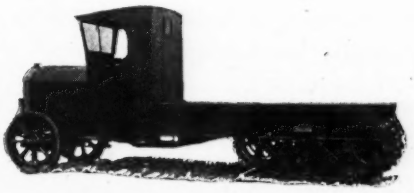
Can you imagine a more powerful, stronger or more practical hauling machine?

Regularly equipped with its five-ton Sheldon front axle, the Linn Geared-to-the-ground Tractor hauls four times its weight, winter and summer.

Sturdily built Linn Tractor Trailers, each of five tons capacity, of sled or wheel type and other specially Linn built equipment, make the Linn Tractor adapted to all kinds of heavy hauling.

Winter's work must be done. Paper mills, lumber camps, building contractors, coal, telephone and public service companies are geared to reconstruction efforts. Countless industries will welcome the Linn Tractor as the only solution to their transportation problem.

The Linn tractor possesses a field of its own, as distinct from the motor truck and ordinary tractor as are the latter from the steam railroad.



And in its field the Linn Tractor is without competition. All weather is good weather; all roads are good roads where a Linn Tractor operates.

Aladdin's lamp could fulfill no greater wish of men who merchandise the vehicles of transportation.

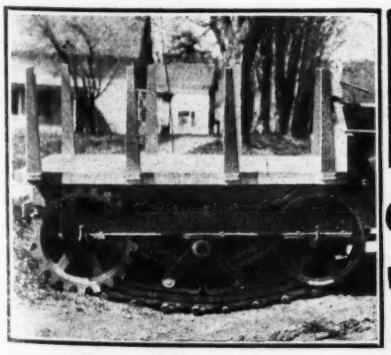
In any territory there are enough potential sales possibilities to keep at least one live wire hustling through the winter months.

The Linn proposition is exceptional—in any way you decide to look upon it.

Catalog and complete information gladly furnished upon request. Write or wire today for details.

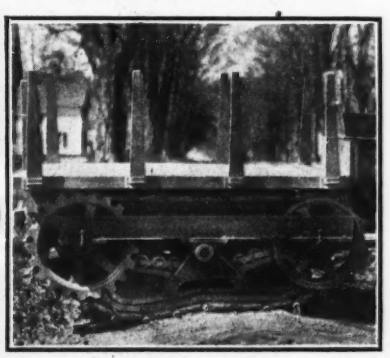
LINN MFG. CORP.
Morris, N. Y.

Action of **flexible** geared-to-the-ground traction member over ground depression shows gain over **rigid** type of construction.



LINN
GEARED TO THE GROUND
TRACTOR

Ground irregularities give **increased** traction to this **flexible** lagbed.

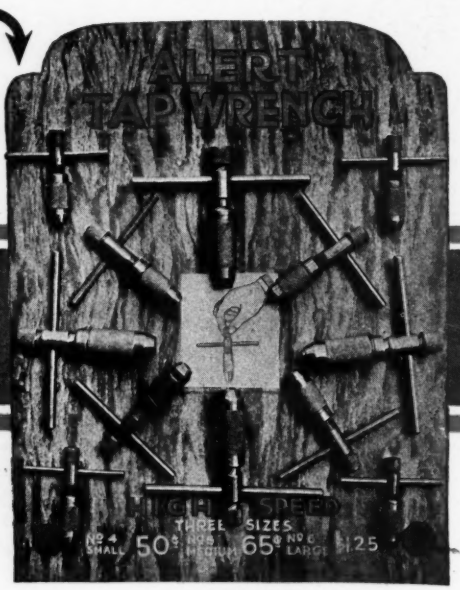


DISPLAY BOARD No. 456—HIGH SPEED SOLID TAP WRENCHES

			Length Inches	Capacity Inches		Price	Total
4	No. 4	2¼	1/16 to 3/16	@	$0.50	$2.00
4	No. 5	3½	1/8 to 3/8	@	.65	2.60
4	No. 6	4⅝	3/16 to 1/2	@	$1.25	$5.00
				Total List		$9.60



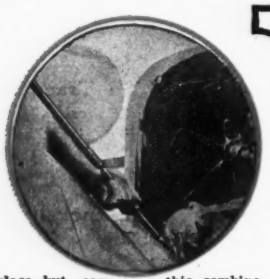
Display Board No. A. B. X.



SOLID

HIGH SPEED SOLID TAP WRENCHES (Long Lengths, Styles A and B; Extensions, Style X)

			Length Inches	Capacity Inches		Price	Total
1	No. 4A	6¾	1/16 to 3/16	@	$0.90	$0.90
1	No. 5A	7	1/8 to 3/8	@	1.25	1.25
1	No. 5B	13	1/8 to 3/8	@	1.50	1.50
2	No. 5X	13	1/8 to 3/8	@	1.50	3.00
1	No. 6A	7¼	3/16 to 1/2	@	$1.75	$1.75
1	No. 6B	13¼	3/16 to 1/2	@	2.00	2.00
2	No. 6X	13¼	3/16 to 1/2	@	2.00	4.00
				Total List		$14.40



A tight place but—easy with this combination 6B and 6X High Speed Solid Tap Wrenches.



This combination of No. 3 Ratchet and No. 6 High Speed Alert Tap Wrenches takes the corners out of close quarters.



No other but an Alert Ratchet Tap Wrench could get at this job.

You Pay For Them!

THE INDIVIDUAL automotive mechanic, the garage or repair shop which neglects to provide itself with labor saving tools suffers from lack of efficiency. Eventually higher standards force it to adopt such labor saving tools. Long before they're put to work, these tools are paid for by the loss of profits that went to better equipped competitors. The longer the neglect to pay cash for them, the greater their cost in lost profits.

A case in point; A workman wastes hours in devising a makeshift to be used with pliers and socket wrench for tapping or reaming a hole close to a generator, clutch, differential or some equally hard-to-get-at spot.

The time he could have saved on just one such job with an Alert High Speed Tap Wrench or with an Alert Ratchet Tap Wrench, would have paid for his choice of these efficient little time and labor saving tools.

ALERT TOOL

237-39-41 North Sixth Street,

TOOLMAKERS'

ALERT TAP

ALERT TAP



RACHET

DISPLAY BOARD No. 123—ALERT RATCHET TAP WRENCHES

		Length Inches	Capacity Inches		Price	Total
4	No. 1	3	1/16 to 3/16	@	$2.00	$8.00
4	No. 2	3¼	1/8 to 5/16	@	2.00	8.00
4	No. 3	5 3/16	3/16 to 1/2	@	$2.50	$10.00
	Total List					$26.00



DISPLAY BOARD No. 36X—ALERT RATCHET EXTENSION TAP WRENCHES

4 No. 3 Ratchet Tap Wrenches, length over all, 5 3/16"; capacity 3/16 to 1/2 @ $2.50 Total.....$10.00
4 No. 6X High Speed Tap Wrenches, length over all, 13½"; capacity 3/16 to 1/2 @ 2.00 Total..... 18.00

Total List (4 sets) @ $4.50 per set.....$18.00

WhyNotGetThem?

AS MANUFACTURERS, we have utilized our opportunity to create a family of products intended to help accomplish two jobs where but one was done before. Alert Tap Wrenches allow automotive mechanics to keep step with Father Time on predetermined production costs.

To spread this gospel of efficiency is the duty and privilege of every Jobber and Dealer whom we can reach. The Display Boards pictured here offer a convenient and inexpensive way for you to introduce Alert Tap Wrenches to those who are in great need of them.

Your order for one or more of these displays obligates us to in every way help you make Alert Tap Wrenches a more profitable and paying part of your business. You are at once assured of unusual sales helps and our other plans for business building, the details of which we are ready to send at your earliest convenience.

COMPANY

Philadelphia, Pa.

SPECIALTIES
WRENCHES



This Alert (long length, style B) High Speed Solid Tap Wrench never lets an awkward spot stop the work.



This Alert (long length, style A) High Speed Solid Tap Wrench eliminates extra length taps.



Alert Ratchet Tap Wrenches save tap breakage.

WRENCHES

The Motor Truck bought to-day without Electric Starting and Lighting will be out of date to-morrow

BETHLEHEM MOTOR TRUCKS

Internal Gear Drive

Dependable Delivery

BETHLEHEM MOTORS CORP'N. ALLENTOWN, PA.

The Motor Truck bought to-day without Electric Starting and Lighting will be out of date to-morrow

Visualize the Selling Possibilities of the Bethlehem Line—

A complete line with utmost value per cost dollar, backed by the closest kind of factory cooperation and a gigantic advertising campaign that is getting results.

Bethlehem Dealer Prosperity is nationwide. It is founded on Bethlehem Performance. Is your territory open?

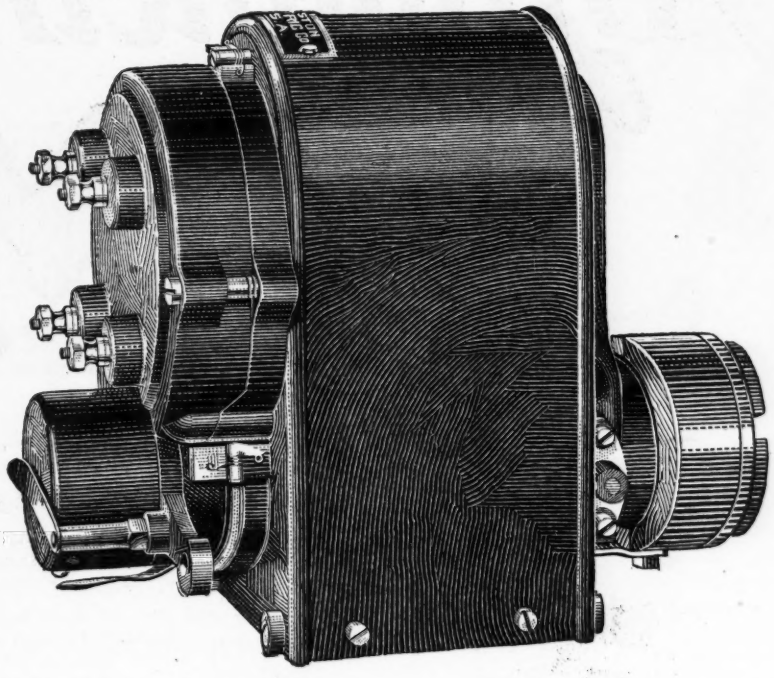
1½ ton chassis	2½ ton chassis	3½ ton chassis
$1965	**$2365**	**$3465**

F. O. B. Allentown, Pa.

BETHLEHEM MOTORS CORPORATION

ALLENTOWN PENNSYLVANIA





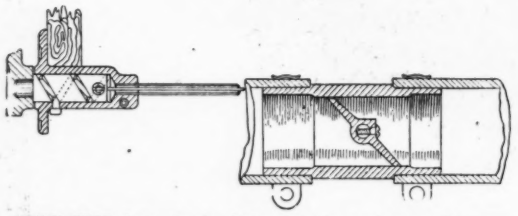
A more dependable magneto, with a hotter spark—a magneto that enables you to get that last atom of power from your fuel — a magneto that means long service, a magneto with a true automatic impulse starter—that is the time-tested Kingston.

KINGSTON MAGNETOS

THE KOKOMO ELECTRIC CO., Kokomo, Indiana, U. S. A.

Branches: New York City, 1733 Broadway; Chicago, 1430 Michigan Ave.; Detroit, 870 Woodward Avenue; Los Angeles, 501 W. Pico Street; Boston, 15 Jersey Street

Announcing TEMP-



TEMP-TROL is a simple device consisting of a hand control mounted on the instrument board operating a butterfly valve set into the hose line. Closing this valve restricts the water flow to the motor, holding it in the waterjacket where it quickly heats to efficient temperature. Slowly opening valve gradually brings entire radiator contents to efficient temperature. Where you use TEMP-TROL the motor warms up quickly. With a car not TEMP-TROL equipped you must wait until 4 to 10 gallons of water are brought up to an efficient operating temperature.

A Big Winter Seller

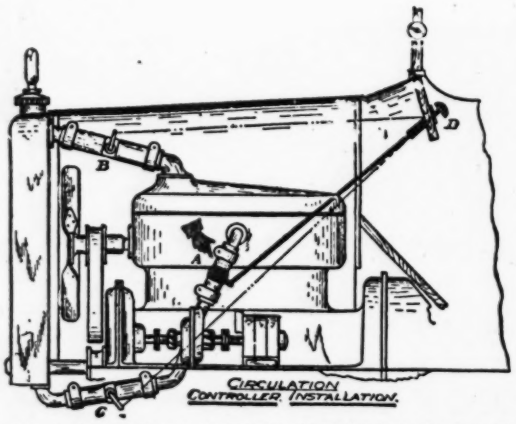
You know that every owner of a passenger car, truck or tractor experiences "cold motor" trouble. You have the same trouble yourself. The first cool fall weather starts it—and for six months—the nuisance and delay of "warming her up" is with us.

TEMP-TROL is a fast seller during the fall, winter and spring months, because it is the only device on the market within pocket-book reach which enables the motor to "warm up" rapidly.

Keeps Motors at Summer Efficiency All Winter

TEMP-TROL makes it possible for any car owner to enjoy winter driving with all the pleasure of summer flexibility. It develops perfect motor performance quickly, regardless of outside temperature.

No matter how cold the weather, you can regulate TEMP-TROL to maintain temperature on the circulation system for most efficient motor operation. TEMP-TROL enables you to keep step with the thermometer. You simply adjust the little control on the dash to existing weather requirements.



Illustrating attachment at any one of three points—A, B or C. Note manual control conveniently located on dash.

Fits All Cars, Trucks, Tractors and Motor Boats

6,500,000 cars, trucks and tractors used TEMP-TROL. Every car in your town needs it, and necessities are the best sellers.

JOHNSON
DETROIT

-TROL $7.50

Cuts Gasoline Waste in Cold Weather

TEMP-TROL brings the cooling system to efficient temperature in a minimum length of time. Consequently, efficient heat is consistently maintained in all manifolds, waterjackets and passages, regardless of outside temperature. The saving of gasoline is considerable.

The carburetor choker need be used very little.

Prevents Carbon Formation —Saves Oil

Through reducing the quantity of unburned gas in the cylinders, TEMP-TROL decreases the possibility of dilution of the crank-case lubricant. The chance of oil working past the piston rings (the cause of most carbon trouble) is materially reduced.

TEMP-TROL protects against defective lubrication caused by lubricant dilution—indirectly protecting your main engine bearings.

Manufactured and Guaranteed by the Johnson Co.

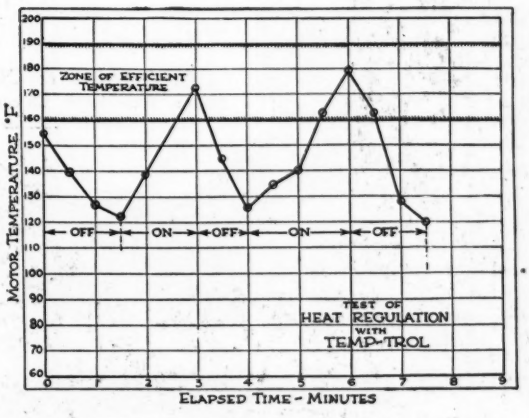
The Johnson Co. is one of the largest and best known manufacturers of carburetors in the industry. Its reputation is for fine workmanship. Its products are standard equipment on some of the best cars built.

TEMP-TROL is manufactured with carburetor precision. It is beautifully finished. It is GUARANTEED and sold on 30 days' money-back trial.

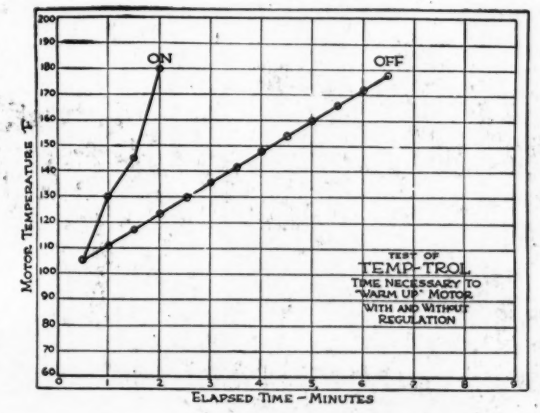
Distributors and Dealers—TEMP-TROL offers you unusual sales and profit possibilities. It is new. It is necessary to every car, truck and tractor. It costs less than a good head cover. It is manufactured and guaranteed by a concern well known to industry and trade. Wire or write for full particulars.

COMPANY

MICHIGAN



Test to determine effectiveness and accuracy. Note how motor temperature drops without control in operation (OFF) and the rapidity of temperature increase with control operative (ON). Only with control ON was it possible to reach temperature of 180 degrees—in the zone of efficient temperature.



Illustrating test made to determine rapidity with which motor may be warmed up after starting, with control "ON" and with control "OFF", with radiator covered up.


"DEFIES TIME AND THE ELEMENTS"
Affords protection at all times—a long-lasting, rich appearing, top fabric, backed by our reputation gained through 71 years' manufacturing experience.
Drednaut is costly but not extravagance owing to its sterling quality of durability.
Write for Samples.
L. C. CHASE & CO.
Boston New York Chicago
Detroit San Francisco

A Year 'Round Market

for the

Cletrac

TANK-TYPE TRACTOR

CLETRAC Dealers the country over enjoy a year 'round active market—there are no periods of sales stagnation—no months when they must be content without sales—not a day in the year when they must close up shop because there is no immediate need for the Cletrac.

There are a thousand and one jobs on the farm that the Cletrac will do better than horses or mules during the winter months. It will clear the wood lot when the footing is wet, slippery and muddy; it will saw wood, grind feed, run ditches and trenches, clear the roads of snow and harvest ice.

Then there is road cleaning and repairing for the township, city and county, and heavy hauling that neither trucks nor other types of tractors could handle in the muck and slush of winter roads.

The Cletrac lays its own broad metal tracks wherever and whenever there is work to be done. It is sturdy, compact and economical. It burns kerosene perfectly.

You will find a Cletrac dealership profitable every day in the year—winter as well as summer. It will help you to build business when other lines are slow.

Our book for dealers, "Sale Quality in Tractors," is a factful story of dealer opportunity. Send for your copy today

The Cleveland Tractor Co.

19169 Euclid Ave. Cleveland, Ohio



Largest Producers of Tank-Type Tractors in the World

Jacks that are Never Joy Killers

NO fear that something is going to bend, snap or "get mulish" haunts the user of a Walker-Badger Automobile Jack. He faces tire changing with snug assurance there'll be no jack-jockeying—no tinkering. He knows exactly what to expect, when **buying** a Walker-Badger Jack.

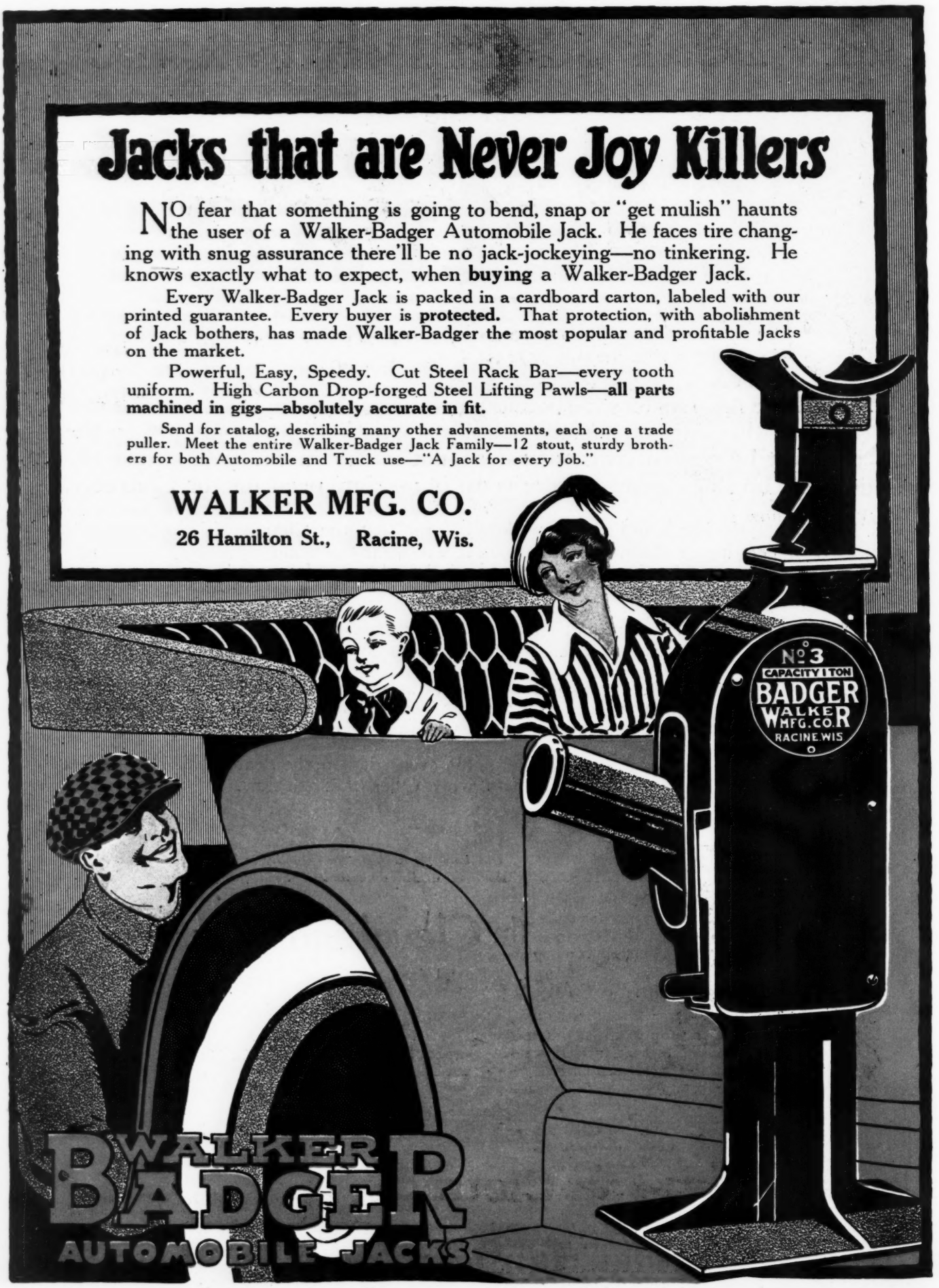
Every Walker-Badger Jack is packed in a cardboard carton, labeled with our printed guarantee. Every buyer is **protected.** That protection, with abolishment of Jack bothers, has made Walker-Badger the most popular and profitable Jacks on the market.

Powerful, Easy, Speedy. Cut Steel Rack Bar—every tooth uniform. High Carbon Drop-forged Steel Lifting Pawls—**all parts machined in gigs—absolutely accurate in fit.**

Send for catalog, describing many other advancements, each one a trade puller. Meet the entire Walker-Badger Jack Family—12 stout, sturdy brothers for both Automobile and Truck use—"A Jack for every Job."

WALKER MFG. CO.

26 Hamilton St., Racine, Wis.



ACME

The Pinnacle of Performance



At a Cost of Four Spark Plugs

THE 2-ton Acme shown above is over 18 months old and during that time has never been out of commission a single day. The total repair expense for the year and a half continuous running has been $4.00 for 4 spark plugs. Now there's another Acme in use and that, too, is giving the same good service.

2-ton Acme owned by the Southern Spring Bed Co., Atlanta, Ga., run 18 months with a repair expense of only $4.00 for spark plugs.

Units Correctly Assembled and Well Balanced

That is the secret of every Acme success. Every unit is selected which will measure up to the requirements of the truck and give it perfect balance—units of proved service like Continental motors, Timken bearings, axles and drive, Borg & Beck clutch, Ross steering gear, Cotta jaw clutch transmission with gears always in mesh, heat treated pressed steel frame, etc.

The Seal of Dependable Performance

ACME
THE TRUCK OF PROVED UNITS

Trade-Mark Registered U. S. Patent Office

Built in 1, 1½, 2, 3½ and 5-ton models
Every Model Consistent in Design

It you want a truck connection that will be a source of personal pride as well as a source of increasing profit from year to year, investigate the Acme. Write for our book "Pointers to Profits" and get the inside story of the Acme. Dept. 137.

ACME MOTOR TRUCK COMPANY, CADILLAC, MICH.

Even in the coldest Weather



Model "H" Oil-Kipp for steering knuckles and other vertical positions.

Patented
April 16, 1918



Model "K" Oil-Kip for Spring Pins and other horizontal positions.

The frequent squeaks and rattles in the chassis and the hard steering that develop during cold weather, really only emphasize the need for Oil-Kipp lubrication.

Because they move only part way round, spring bolts and steering gear cannot at any time be lubricated all the way round by grease cups.

In cold weather they can hardly be lubricated at all by grease.

They require oil, heavy oil, forced through the drill holes so powerfully that it will immediately spread all over the bolt, column, or knuckle.

Oil-Kipps shoot heavy oil even in the coldest weather. Their operation is simple. Just snap the spring plunger.

They kill squeaks and rattles, they make steering and lubrication simple, clean and convenient.

Each one is really a little magazine oil-pump that one filling will load with twenty or more shots—enough for a month or more—and they shoot so forcefully that with them you can even clean the old packed grease out of drill-holes and bearings.

Perhaps your dealer already has them. If he hasn't, send for descriptive literature and other information—or ask your dealer to inquire about our dealer's proposition.

MADISON-KIPP CORPORATION
MADISON, WISCONSIN

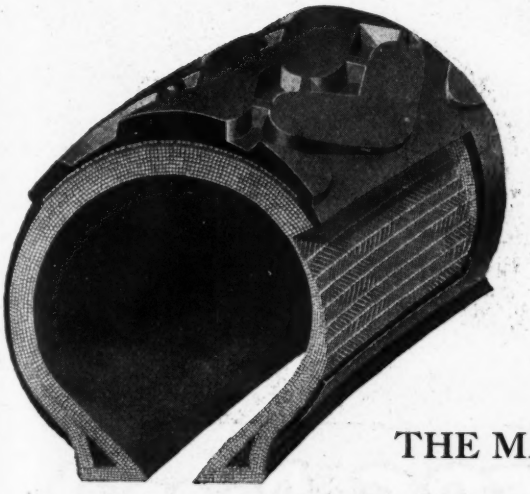
Madison Kipp

Oil-Kipps

KEEP CARS NEW

MARATHON





CARRYING THE OVERLOAD

Exclusive selling features, developed in over seven years of quality tire manufacture, make the Marathon Cord Tire one of the fastest sellers in the field.

Hand-built for the hardest kind of usage, they have never failed to deliver that class of superior service which you rightly expect from "MARATHON."

Distributors selling Marathon Cord Tires secure more liberal sales and advertising assistance, and a much greater net profit.

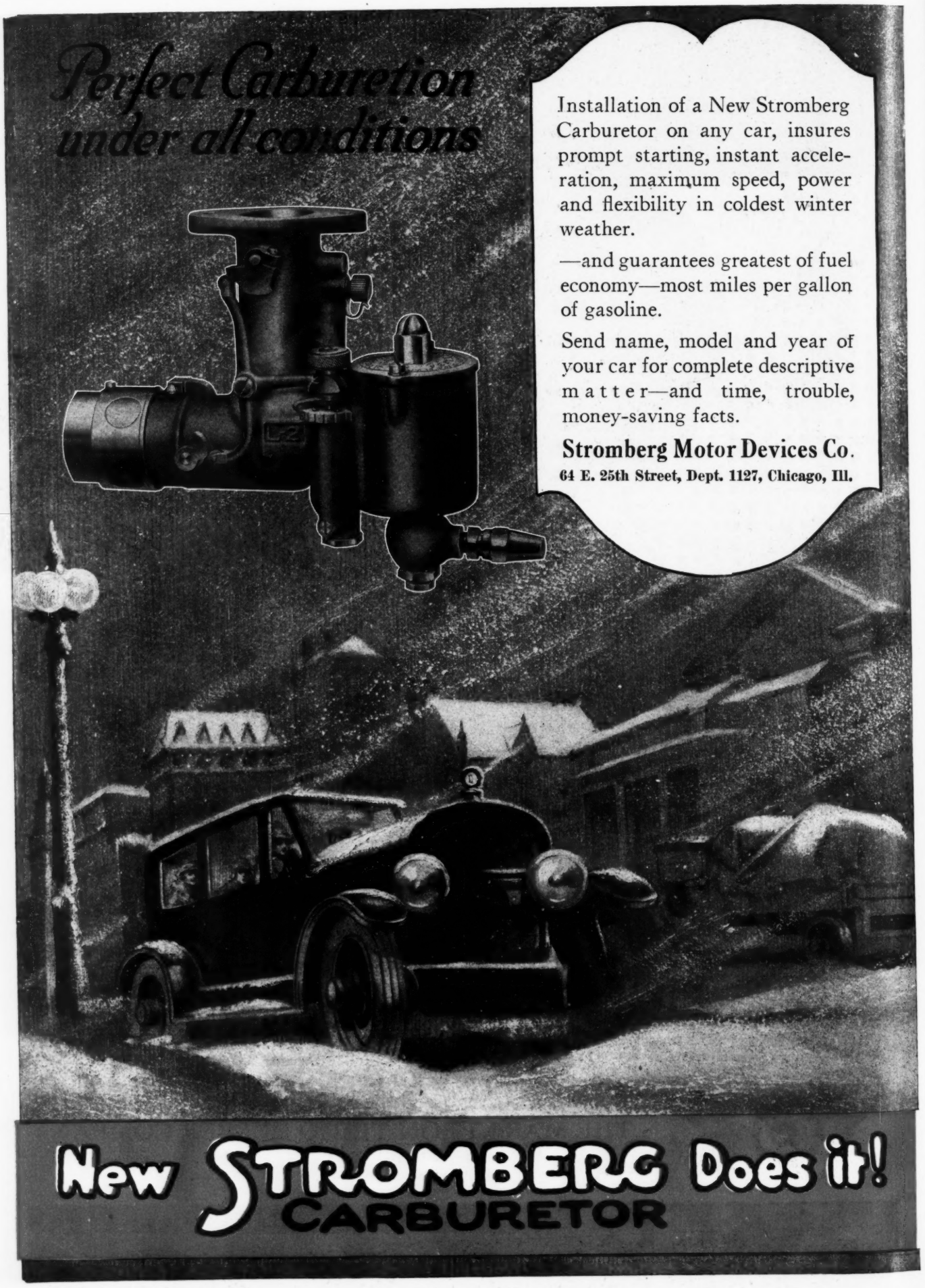
Write us for exclusive territory.

THE MARATHON TIRE & RUBBER COMPANY

Cuyahoga Falls, Ohio

Canadian Factory, St. Catherines, Ont.

TIRES


Perfect Carburetion under all conditions
Installation of a New Stromberg Carburetor on any car, insures prompt starting, instant acceleration, maximum speed, power and flexibility in coldest winter weather.
—and guarantees greatest of fuel economy—most miles per gallon of gasoline.
Send name, model and year of your car for complete descriptive matter—and time, trouble, money-saving facts.
Stromberg Motor Devices Co.
64 E. 25th Street, Dept. 1127, Chicago, Ill.
New STROMBERG Does it!
CARBURETOR

VIOLET RAY
AUTO LENS
LEGAL GLARELESS AND SAFE

The Blue Lens With Black Visor

The Violet Ray Lens is the lens you will eventually buy, because it gives just the light you want.

Made of blue glass with prisms so designed and placed that they throw the light down and to the sides—

And with a black visor that prevents any annoying upward rays.

The blue absorbs all ultra-violet or glare rays. The light is big but not dazzling. Safe to drive by and legal in all states.

The demand for this newer, better lens is growing rapidly. Already our factory is operating at full capacity. Dealers who handle the *Violet Ray* are doing their customers a real service, and incidentally making money. They are dealers who now find no complaint with the lens business. Write for our dealer proposition.



MORE LITE AUTO LENS

More-Lite lenses are now in service from Maine to California, over a million pairs of them. They give a soft diffused light that is legal everywhere, courteous and highly efficient.

No other lens at the same or near the same price can compare with them.

More-Lite Prices

6 to 8½ in.	$1.50	9⅝ to 10¼ in.	$2.00
8⅝ to 9½ in.	1.75	10½ to 11¼ in.	2.25



$3 Per Pair Any Size
West of Rockies
$3.50 per pair
Canada
$4 per pair

L. E. SMITH GLASS CO., Mt. Pleasant, Pa.

Strom BEARINGS

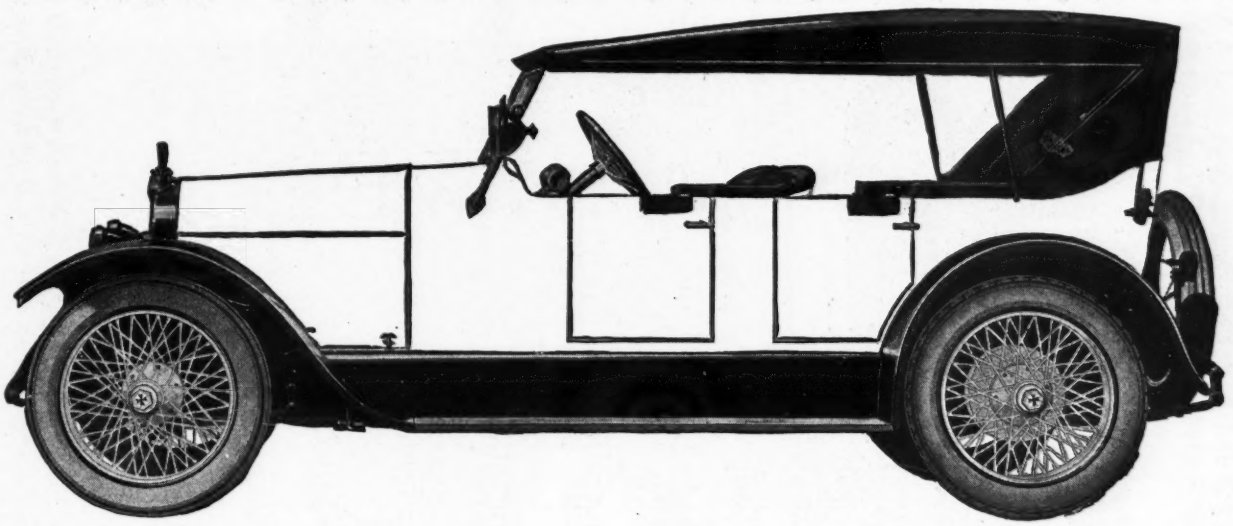
"Quality" and *"Service"* — these explain the Strom success. A quality is built into Strom Bearings which is reflected in the unusually dependable service they are giving in many lines of industry. "Quality" and "Service" account for the fact that from the first the demand for these fine bearings has steadily increased.

U. S. Ball Bearing Mfg. Co.

(Conrad Patent Licensee)

Palmer Street and Kolmar Avenue, Chicago, Illinois





Templar

The Superfine Small Car

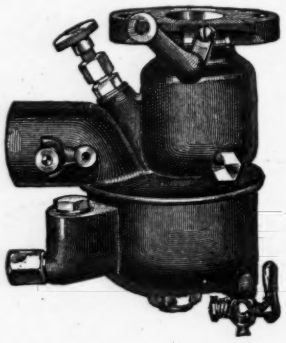
Five Passenger Touring $2485
Four Passenger Sportette $2485
Two Pass. Touring Roadster $2485
Five Passenger Sedan $3385
Prices f. o. b. Cleveland

THE Templar Sportette is a new ultrafine additional model of an already Superfine Car. Built for four passengers—it is the personification of style, luxury and comfort. The body is aluminum, over-upholstered in smooth black leather. The car is low hung, powerful and fast, and surprisingly economical.

Templar Top Valve Motor.

The Templar Motors Corporation

3100 Halstead Street, Lakewood Cleveland, Ohio



Made for

MAXWELL

CARS

KINGSTON CARBURETORS

THE KINGSTON Company, oldest and largest builder of carburetors in America, has perfected a special carburetor for Maxwell cars. The Maxwell Special is simple, staunch, flexible and easily controlled. It will get the last atom of power from your gas. It will operate smoothly, easily, dependably. If you have never known the complete satisfaction in having a carburetor that meets every demand, all the time, in good conditions and in bad, investigate this special Maxwell Kingston. ¶ It has been built for the Maxwell owner. It will solve, once and for all, his carburetor problems. It is backed by the strongest guarantee that we know how to make.

TO MAXWELL OWNERS—The price of this super carburetor, with hot-air stove complete, is $11.00. If your dealer can't supply you send order to us direct. TO DEALERS—Write at once for special proposition.

BYRNE, KINGSTON & CO., Kokomo, Indiana, U. S. A.

BRANCHES: New York City, 1733 Broadway; Chicago, 1430 Michigan Ave.; Detroit, 870 Woodward Avenue; San Francisco, 1235 Van Ness Avenue; Boston, 15 Jersey Street





Proves Itself by Starting Cars Instantly on Cold Mornings

The Mac-Lar Master Storage Battery is taking the country by storm.

The simple "Spike Test"—which any dealer can make with two ordinary twenty-penny spikes—shorted across the battery until melted, requiring a fraction of a minute—demonstrates the stamina, and ability of the Mac-Lar to stand the abuse to which automobile storage batteries are subjected.

Our Guarantee covers the Mac-Lar Master Storage Battery when placed in any 6 or 12-volt electrically equipped car, regardless of the size of battery originally used, provided the electrical apparatus is in good condition.

Because of this, we are warranted in saying that the Mac-Lar Master Battery furnishes replacement for **more** than 99 per cent of the electrically equipped cars in use today.

The Mac-Lar Master Storage Battery will prove a blessing to you these chilly mornings, because of its quick response, due to its unexampled high momentary discharge rate.

This high discharge rate does away with the endless spinning of your motor which exhausts ordinary batteries. Mac-Lar starts your car when you want it to start—**quickly, easily** and as **surely** as it melts the spikes under the dealer's test.

The amazing success of our dealer proposition this year points the way to big distributor opportunities for 1920. We invite correspondence from substantial, well-financed battery merchants.

MAC-LAR BATTERY COMPANY, INC., DETROIT, U.S.A.

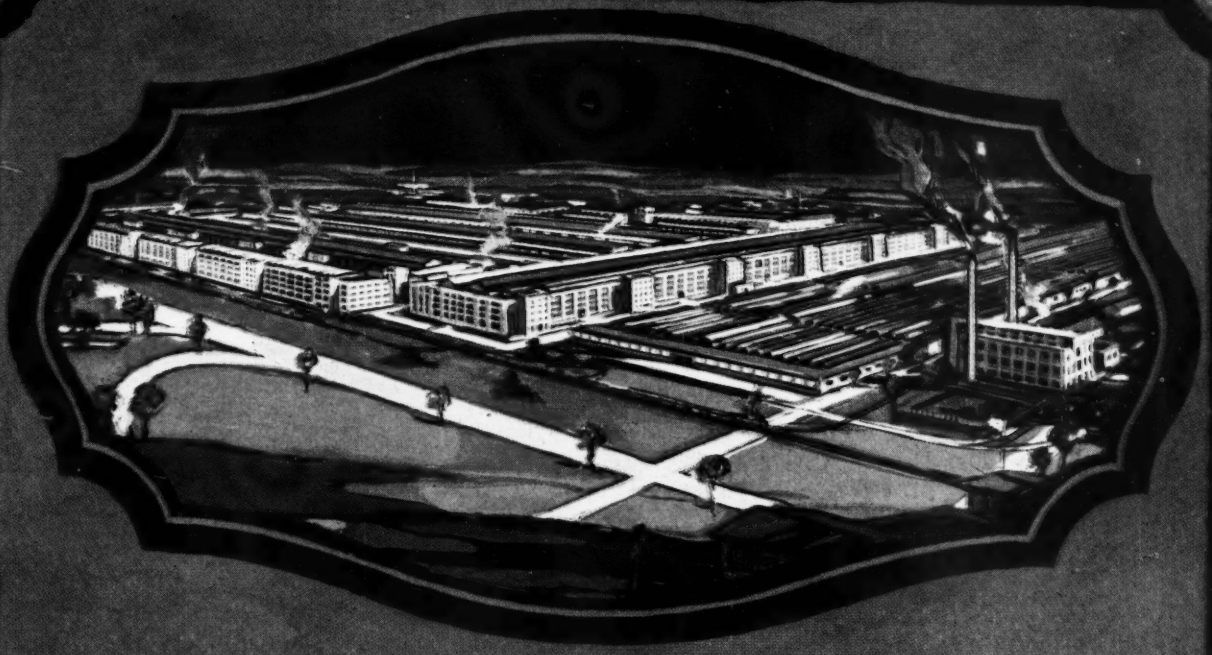
The 18 Months' Guaranty in Writing Assures Long Life

This absolute guaranty assures you that the Big strong force of the Mac-Lar Master Battery will last —that your customers will get complete satisfaction.

It all gets back to the special process which enables us to build into the Mac-Lar three advantages never before combined in the same battery. (1) Extremely hard plates which guarantee long life, (2) 25 per cent extra capacity for the same plate area and a higher momentary discharge rate than any soft plate battery, and (3) unusual recharging efficiency.

MAC-LAR
MASTER STORAGE BATTERY


QUALITY
SNAP RINGS
PREDOMINATE
"More than
a Million
a Month"
THE Piston RING COMPANY
Muskegon Michigan



The new $15,000,000 STUDEBAKER Automobile Plant at South Bend

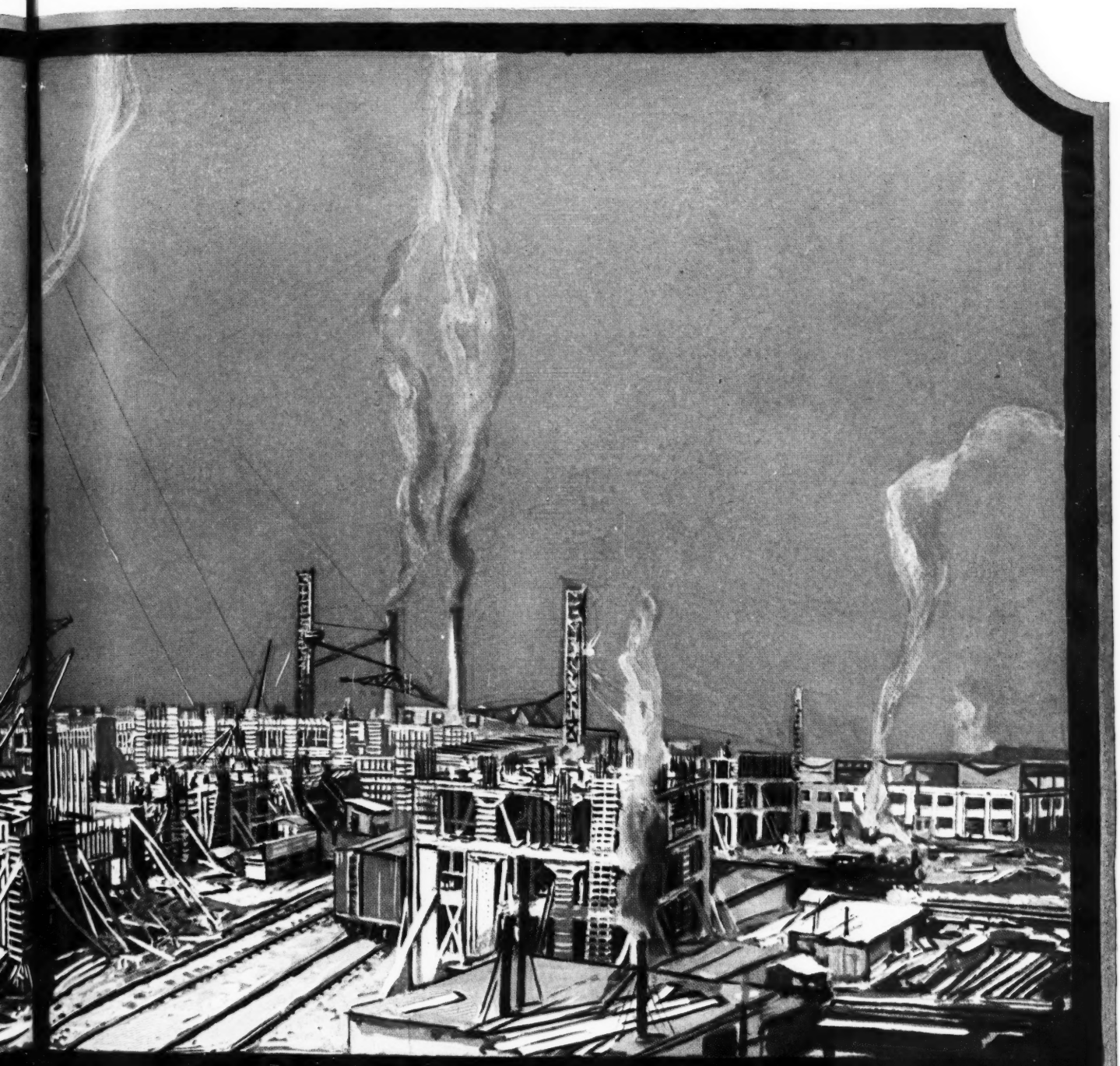
Capacity when finished-150,000 cars per annum



This construction photograph, showing part of the new $15,000,000 Studebaker plant, was taken September 9, 1919. In the background is the new drop forge plant, now partially operating and almost completely equipped. In the foreground are the forms for the reinforced concrete work of the final assembly building. Other buildings, not within the range of the camera, have either been completed or are building. Since September 9th, construction work has progressed rapidly. Fifteen hundred workers are employed.

ABOUT four years ago, The Studebaker Corporation determined to build a large, modern automobile plant at South Bend, with a production capacity of five hundred cars per day. Construction engineers and production experts made exhaustive investigations and studies of the construction, equipment and methods of numerous modern plants throughout the United States, and incorporated in the plans for the South Bend plant every improvement and practical device for economical production developed by this investigation. While construction work was interrupted by the war, about 40% of the plant will be completed by January 1st; and by April 1st next, about 150 cars will be produced daily, with increases from that time onwards.

The new plant of steel and concrete construction is equipped with new machinery of the latest design—every known device for efficient and economical manufacture—and will be operated by a highly trained corps of engineers and production experts, unexcelled in the automobile industry. Commodious space

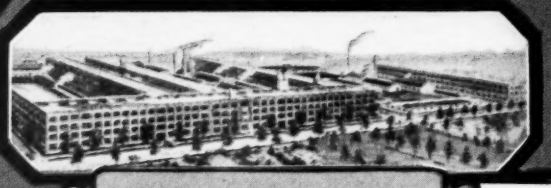


and equipment is provided for the laboratories, experimental department and engineering department, where research experiments, improvements and new designs will be carried on daily by a large, able staff of engineers and chemists.

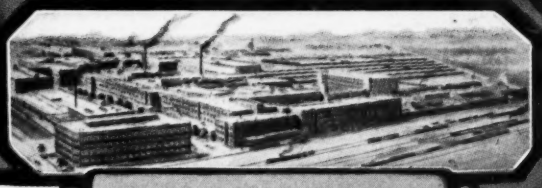
The new plants will produce all castings, forgings and stampings for Studebaker cars. The latest heat-treating and carbonizing equipment and machine shops are provided, with shops for open and closed bodies also included, together with a warehouse with storage capacity of 3,000 cars and ample railway and track facilities for shipping. A large recreation hall with theatre is provided for employees' and dealers' meetings. The new plant, when entirely completed, will cover eighty-five acres, cost $15,000,000, and be unexcelled in America in modernity and efficiency.

The Detroit plants of the corporation will be continued as heretofore, producing Studebaker cars in large quantities. The South Bend plant is an addition to the capacity of the corporation.

Studebaker



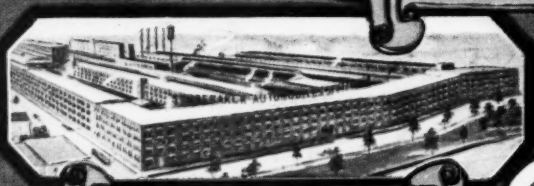
Plants No. 5 and No. 10, Detroit



Plants No. 1 and No. 2, South Bend



The new Plant at South Bend
Manufacturing capacity, 150,000 cars per year



Plants No. 3 and No. 4, Detroit



Plant No. 7, Walkerville, Canada

STUDEBAKER'S tremendous resources and plant facilities are amply illustrated above and give a true and exact reproduction of all its plants now in use and of the new plants as they will appear when completed. With such manufacturing resources, recognized engineering skill and production ability, Studebaker will, beginning with 1920, be better able to supply the ever-increasing demand for its automobiles, now grown to such an extent that "Studebaker cars are probably the most talked of in America today."

THE STUDEBAKER CORPORATION *of* AMERICA

Detroit, Mich. South Bend, Ind. Walkerville, Canada

The Breath of Winter

In the Air

CONGEALED or frozen oil in the crank case is the cause of many Winter motoring troubles.

Stripped gears
Scored cylinders
Burnt out bearings
Run down batteries

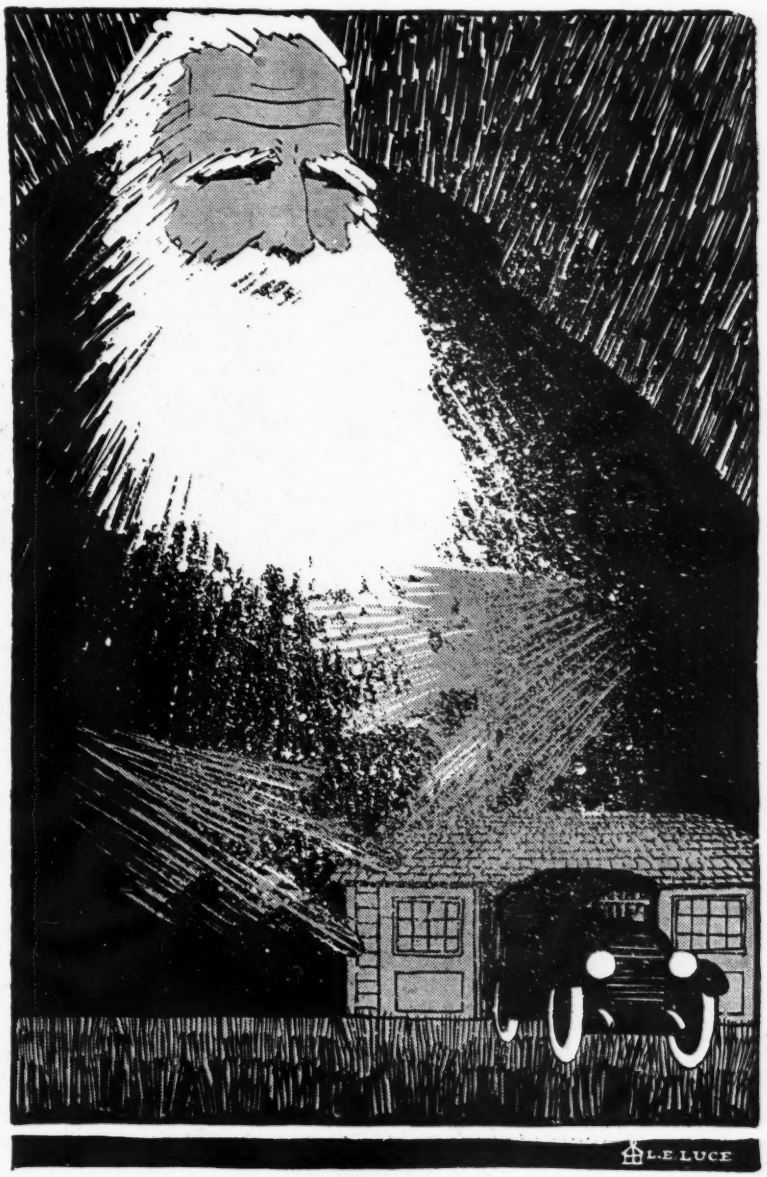
A great many oils freeze solidly at 10 degrees above Zero, as they contain paraffine which thickens in moderately cold weather.

Supreme Auto Oil

Flows Freely at Zero Starts With the Engine

There can be no possible lack of lubrication, even below Zero, as SUPREME AUTO OIL positively contains no paraffine, being manufactured from Southern Asphalt-base Crude. Get it from any dealer displaying the sign of the orange disc.

Write for booklet for further particulars, prices, etc.



GULF REFINING COMPANY

General Sales Offices: Pittsburgh, Pa.

District Sales Offices:

New York Philadelphia Boston Atlanta New Orleans Houston



Un-retouched photograph of a motor truck equipped with Goodyear Cord Pneumatic Truck Tires and used in general farm service by A. J. Emmerton, Bloomer, Wisconsin

GOODYEAR

AKRON

Bloomer, Wis., Welcomes Pneumatics Because They Save Roads

"MY use of Goodyear Cord Pneumatic Truck Tires shows me that pneumatics not only travel better on our clay roads but also are better for the roads. Solids have a hard time in the soft ruts and they are hard on the roads. I have observed that others here are taking note of this."—A. J. Emmerton, Farmer, Bloomer, Wisconsin

There is scarcely any work done on the Emmerton Farm near Bloomer, Wisconsin, that is not aided directly or indirectly by a motor truck on Goodyear Cord Pneumatic Truck Tires.

Due to the traction of its tires, the truck is able to carry full loads of fertilizer over plowed ground where solid tires could not go.

For the same reasons, the truck is able easily to haul feed to cattle and hogs wherever they may be, to carry oil promptly to tractors in the fields and to distribute fencing.

For the same reasons it is able easily to carry corn from the binder to the silo filler and grain from the separator to the bins.

This off-the-road hauling, of course, represents duty for which solid tires are not fitted because they spin and stall in soft going.

But Mr. Emmerton's experience also makes clear that the big Pneumatics have practically equal advantage on the clay roads of Cook's Valley, in which he is located.

The Goodyear-Cord-equipped truck covers stretches that, in bad weather, would mire solid-tired trucks and it covers them in one-fourth the time required by teams.

Also, he finds that after a regular 8-mile trip over a rough route, his cattle are not reduced in weight, crediting this to the easy riding on the Goodyear Cords.

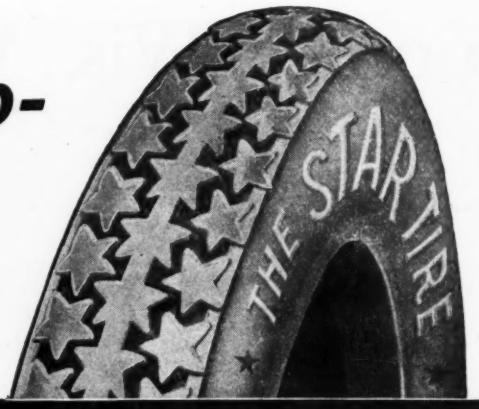
Quite an additional significance, however, attaches to Mr. Emmerton's statement that the Pneumatics are regarded with growing favor in his community because their cushioning action saves roads.

It directs the attention of the motor truck dealer to another important reason back of the rapidly increasing rural adoption of trucks on the pioneer Goodyear Cord Pneumatic Truck Tires.

THE GOODYEAR TIRE & RUBBER COMPANY, AKRON, OHIO

TRUCK TIRES

To Strengthen Reputation as Well as Profits



MERCHANDISE should serve the merchant a double purpose; it should increase his prestige—build his business—as well as his profits. The far-sighted merchant makes this his standard—and selects high-class merchandise, always.

To such a merchant, the Star Franchise is an invaluable asset. Star Dealers, everywhere, are building permanently, profitable tire departments. Both permanence and profit are obtained in the sale of such tires as Stars.

Star Tires are hand-made. They have many features that make them the extra good tires they are. They give the tire buyer what he wants—uninterrupted, long-distance mileage at the lowest cost per mile.

Write us for details. There is a well-stocked distributor near you.

THE STAR RUBBER COMPANY
AKRON'S MASTER TIRE BUILDERS

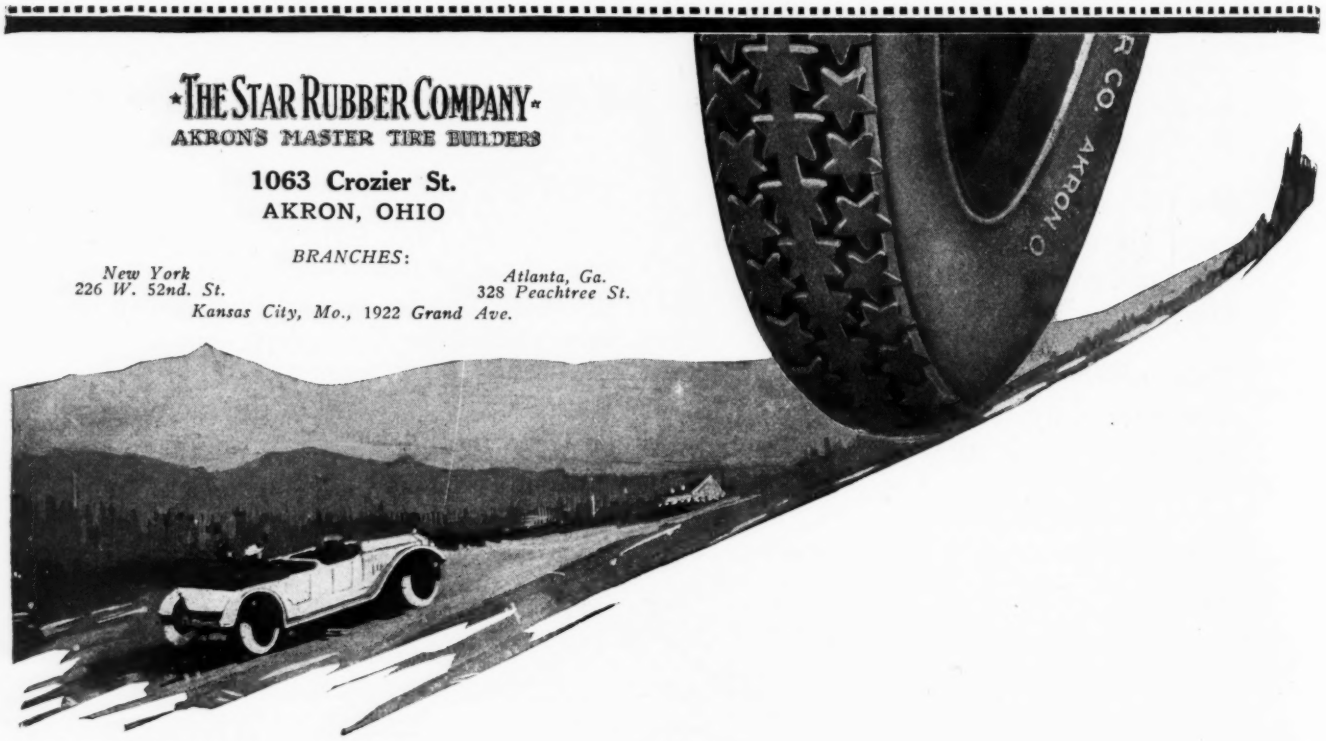
1063 Crozier St.
AKRON, OHIO

BRANCHES:

New York
226 W. 52nd. St.

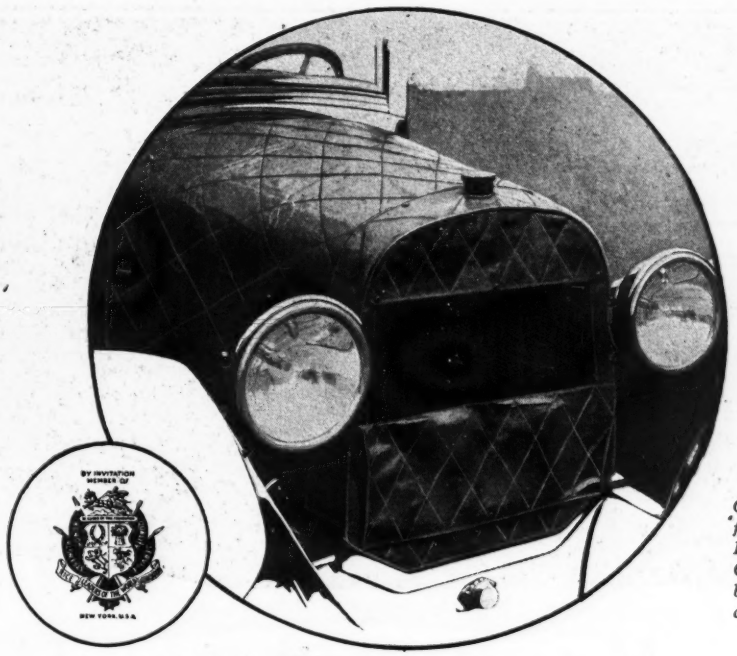
Atlanta, Ga.
328 Peachtree St.

Kansas City, Mo., 1922 Grand Ave.



STAR CORD TIRES

"CAMPBELL RADIATOR & ENGINE COVERS"



Observe how this perfect fitting set of Campbell Radiator and Engine Covers contains all the beauty of lines and curves of this Chandler.

Here is Appearance as well as Protection

Although the motorist is interested in Radiator and Engine Covers mainly from the standpoint of protection, he nevertheless insists that the cover he chooses shall look well, and fit.

The cover to sell him is the Campbell Radiator and Engine Cover—it provides splendid appearance as well as trustworthy protection. It emphasizes the graceful lines of the hood and radiator and rests with the utmost snugness even about such awkward places as cowl, radiator and crank caps.

Exclusive with the Campbell Cover is the arrangement of the flap in front. It is quickly adjustable to any variation in the weather—in moderate temperatures it can be folded half way down, on colder days it can be tightly and securely closed.

There is still a third merit—the materials. The outer covering is of a select pebble grain stock, lined with warm kersey blanket. A middle lining of asbestos is optional.

We can furnish you with these covers for practically any make of car, and make prompt deliveries in any quantities. For your convenience, we have established warehouses in Chicago and New York, in addition to those in Cincinnati. In them we maintain large stocks from which we can supply you on short notice.

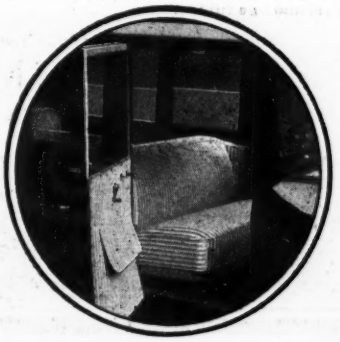
Write us and we will send you full information about our lucrative dealer plan. At the same time, order a set for your car or for your demonstrator. See for yourself how Campbell Radiator and Engine Covers fit.

The Perkins-Campbell Company, 625 Broadway, Cincinnati, Ohio

CAMPBELL DETACHABLE UPHOLSTERY

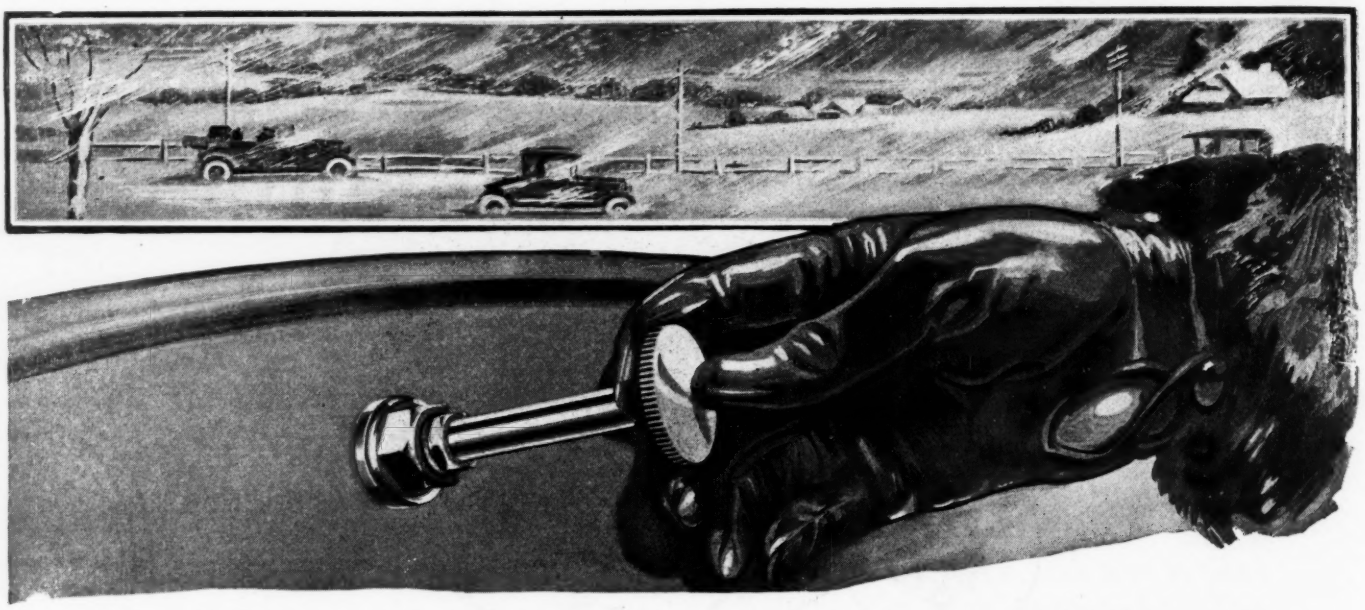
Here is an accessory whose sale is stimulated by cold weather—Campbell Detachable Upholstery for closed cars.

Nothing adds more to the charm of the sedan, coupe or limousine than a set of these faultlessly fitting seat covers—the Aristocrats of Motordom. There is a two-fold advantage in having them—not only do they give a smart touch to the car's interior, but they also serve to protect evening gowns and dainty dresses from seat dust and stains, and cold, clammy leather cushions.



There are twenty-two materials to choose from, fancy stripes, Wearever Cloths, Bedfords, De Luxe, Motor Ducks and several beautiful tapestries.

Your profit from this accessory is large. Moreover, you are not required to carry any stock. Selling is done entirely from a swatch book. Write us for full particulars.



Start Your Motor Instantly in Cold Weather

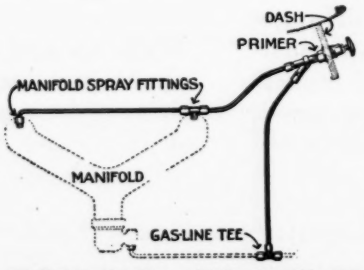
THE Imperial Primer does it **easily, quickly, surely!** In coldest winter weather, one stroke of the Primer, within easy reach on the dash board, sprays fireable vaporized gasoline into the manifold, enabling you to **start instantly.** This prevents any drain on your battery—a feature alone worth many times the price of the outfit.

Imperial Primer

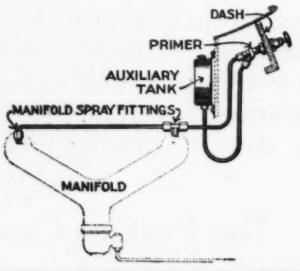
For All Makes of Cars, Tractors and Trucks

An Imperial Primer is easily operated, and is ideal for women drivers. Quickly installed by any garage man in less than an hour or you can, if you like, put it on yourself by following instructions which come with each outfit. All connections are made by means of the well known Imperial Compression Couplings, no soldering, flaring or threading being required, with the exception of drilling and tapping into the manifold for ⅛-inch iron pipe thread.

Imperial Primers are installed as standard equipment on a number of well known makes of automobiles, trucks and tractors, an evidence of its worth. It also can be used for motor boats and sanitary gas engines of all kinds.



No. 55-D Primer Outfit—with Gas Line Tee, $5.50 consists of Primer Pump, Gas Line Tee, Manifold Spray Fittings and Tubing, readily installed on any make of car, including Fords. When ordering this Outfit, always specify outside diameter of main gasoline line tubing.



No. 56-D Primer Outfit—with Auxiliary Tank, $6.00 is similar to No. 55-D, except that it has an Auxiliary tank which holds 1½ pints of gasoline, instead of the Gas Line Tee. Fits all cars, including Fords. Specify if for 1916 or earlier models of Fords.

Imperial Products Include

- Priming Cups
- Shut-Off and Drain Cocks
- Gasoline Tubing Connections
- Oxy-Acetylene Welding and Cutting Equipment
- Lead Burning Outfits
- Carbon Burning Outfits
- Door Guards
- Kick Plates
- Pull and Push Bars
- Bronze Honor Roll Tablet
- Bronze Signs and Name Plates
- Watrous "Doujet" Closets
- Liquid Soap and Dispensers
- Self-Heating Iron
- Imp Flashlite Gun

Comp'ete information given on all items in which you are interested.

Order an Imperial Primer From Your Local Dealer or Garage Man TODAY.

The Imperial Brass Manufacturing Company

1217 West Harrison Street **Chicago, Illinois**

IMPERIAL PRODUCTS

RAYDEX RAYDEX RAYDEX

9,000 METAL REFLECTORS

PROJECTS and CONTROLS the LIGHT RAYS

RAYDEX



The Legal Lens for Headlights

THE honey-comb metallic lens—the lens that projects a brilliant shaft of light—that gives ample side light—that gives more legal light than any glass lens can give. Practically unbreakable. The best light-controlling lens ever offered. Legal everywhere. Easily installed—will outlast the car.

The
GLASSLESS GLARELESS LENS
For AUTOMOBILE HEADLIGHTS and SPOTLIGHTS



No. 999 Shaftlight

A wonderful, legal spot-light. Throws a brilliant shaft of light—9900 Raydex reflectors control the beam—no side light nor glare. Made of aluminum, brass and silver. The finest spotlight made. ***Has a universal bracket that will fit every make and style of car.*** Standard equipment on America's finest cars.

A Profitable Line for the Dealer and Jobber

WHEN you sell Raydex, you sell not only the best device of its kind that can be made, but the line most profitable for you. Both the Raydex Lens and the Raydex Shaftlight are high in quality—with workmanship and materials warranted. They are fully protected by patents and are handled only by the best class of jobbers and dealers.

¶ You are losing money if you are selling an inferior line at a cheaper price and losing profits you can make on Raydex. ¶ Write to-day for our dealers' proposition. In some localities we have an opening for first class jobbers to act as sole distributors. We shall be glad to furnish details.

RAYDEX MANUFACTURING COMPANY

Executive Offices Laboratories & Plant

BRACKENRIDGE, PENNA.

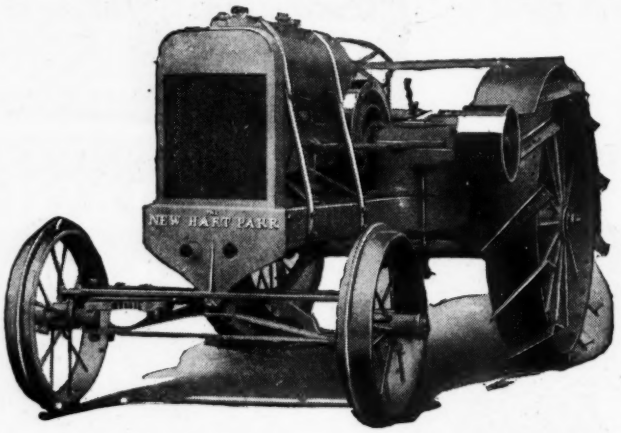
RAYDEX RAYDEX RAYDEX

Official Proof of What the Tractors Pull in the Field

The Hart-Parr 30 Record at the Big Ohio Tests Shows the Results of Many Years of "Knowing How"

The farm tractor built by "The Founders of the Tractor Industry" developed 26½ drawbar horsepower, 96 per cent more than the average of all other three-plow tractors in the tests. In making this record, the Hart-Parr 30 plowed 10½ inches deep in old timothy sod at 3.08 miles an hour.

The Hart-Parr 30 is entirely built in our own big factory—a large output at a low manufacturing cost. If tractors were sold by horsepower developed, the Hart-Parr 30 would be worth from one-third to three times more than any other three-plow tractor in the Ohio tests.

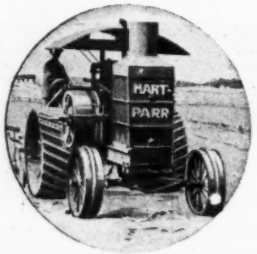


DEALERS: Some excellent territory still open. Selling the Hart-Parr 30 insures success. Write us today.

HART-PARR COMPANY

Founders of the Tractor Industry

529 Lawler St. Charles City, Iowa



Many of the old Hart-Parrs that plowed the virgin prairies of the Northwest are still in use today.

Greatest Tractor Test of All Time

Held by Ohio State University, July-Aug. 1919

TRACTOR	Rating	No. Plows	No. Cyl.	R. P. M.	Fuel	Best Test of Each Tractor: Depth Plowed	Lbs. Pull	Plow'g Speed	Horse Power
HART-PARR	-30	3-14 in	2	750	K	10.25	3240	3.08	**26.50**
Wallis	15-25	3-14 in	4	850	G	9.42	2287	3.25	**19.82**
Moline Universal	9-18	2-14 in	4	1600	G	8.20	2275	3.09	**18.72**
Illinois	18-36	4-14 in	4	800	K	8.12	3125	1.98	**16.59**
Aultman-Taylor	15-30	4-14 in	4	800	K	8.05	2930	2.05	**16.02**
Monarch	18-30	3-14 in	4	800	K	8.42	2600	2.29	**15.91**
Waterloo Boy	12-25	3-14 in	2	750	K	7.12	2480	2.39	**15.78**
Case	15-27	3-14 in	4	950	K	8.06	2720	2.13	**15.45**
Bates Steel Mule	15-22	3-14 in	4	900	K	7.95	2710	2.11	**15.25**
Frick	15-28	3-14 in	4	900	K	8.67	2560	2.18	**14.92**
Emerson	12-20	3-14 in	4	900	K	9.71	3000	1.67	**13.42**
Huber	12-25	3-14 in	4	1000	K	8.94	2158	2.33	**13.40**
Cletrac	12-20	2-14 in	4	1250	K	9.40	1892	2.65	**13.38**
Parrett	12-25	3-14 in	4	1000	K	8.02	1802	2.73	**13.11**
J-T	16-30	3-14 in	4	1000	K	10.07	2285	2.13	**12.99**
LaCrosse 3	12-24	3-14 in	2	750	K	8.55	2160	2.23	**12.85**
Wellington	10-20	2-14 in	4	1000	K	8.60	1584	2.89	**12.18**
Titan	10-20	3-14 in	2	500	K	7.67	1090	2.28	**12.10**
LaCrosse 4	12-24	3-14 in	2	750	K	8.70	2080	2.07	**11.51**
Avery	12-25	3-14 in	2	570	K	8.62	2710	1.37	**11.29**
Fordson	10-20	2-14 in	4	1000	K	7.68	1304	3.09	**10.78**
Heider	12-20	3-14 in	4	750	K	6.37	1972	2.04	**10.76**
Whitney	9-18	2-14 in	2	750	G	6.62	1520	2.63	**10.66**
I. H. C.	8-16	2-14 in	4	1000	K	7.41	1642	2.15	**9.31**
Reliable	10-20	2-14 in	4	600	K	8.72	1575	1.91	**8.02**
Shelby	9-18	2-14 in	4	1100	G	7.95	2100	1.42	**7.97**

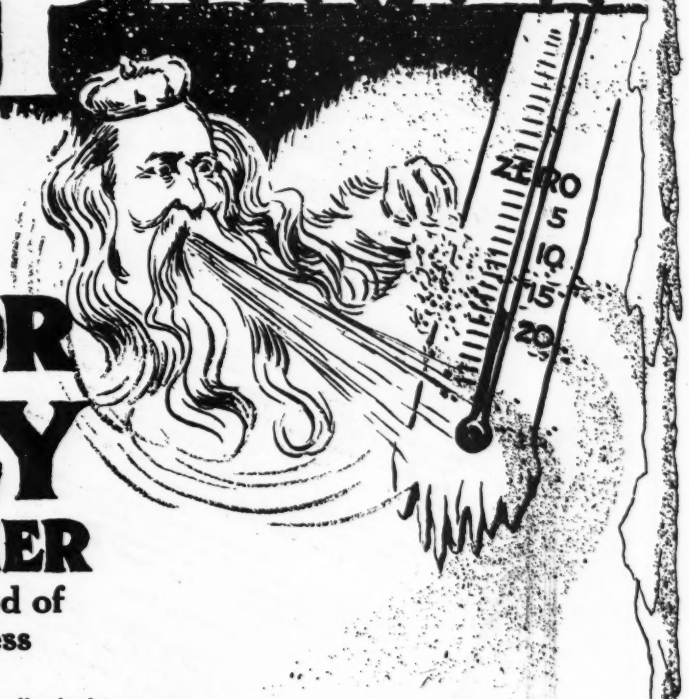
Data from official report Ohio State University. Fuel data from official cards.

ABUNDANT POWER FOR THREE PLOWS. WEIGHS 5158 LBS.

HART-PARR 30

NINETEEN YEARS TRACTOR BUILDING EXPERIENCE

COPLEY PRIMER



WILL START ANY MOTOR INSTANTLY IN COLDEST WEATHER

A Perfected, Dependable Method of Instantaneous Starting Regardless of Climatic Conditions

Mr. Dealer: Is any success—any big success—ever really luck? Not much! Nobody wins haphazard! If you have not sold your share of Primers—you have not had the right Primer.

The COPLEY Primer Sells

and your orders will surprise you. Possibilities for legitimate trade in Primers lie dormant because the user cannot find what is desired!

YOUR CUSTOMER IS LOOKING FOR THE EFFICIENT COPLEY PRIMER

you are in a position to sell him the Copley—Have them in stock! The Copley Primer is constructed on a new principle.

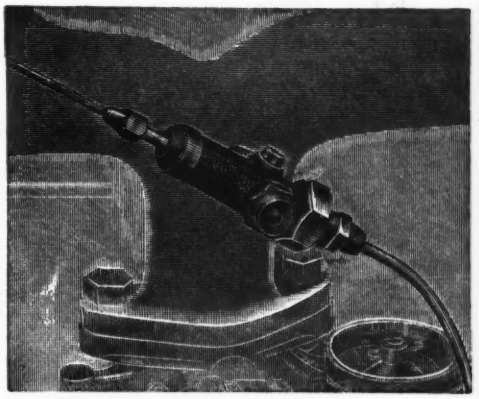
Show Him the Copley Primer

—at a glance, he will see that it's different and GENUINE

The Copley Primer Is Unfailing in Its Capacity of Real Service

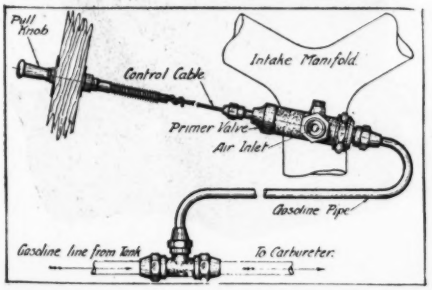
It starts the engine in the coldest weather for it furnishes the cylinders continuously with a carbureted spray of fuel, properly mixed with air. The dealer can sell this device by demonstrating that an engine will run on the primer without a carburetor—on any grade of gasoline.

In operation, the Copley Primer draws gasoline from the fuel line, passes it through a Venturi nozzle, mixes it with the proper amount of air and passes this explosive mixture directly into the manifold, near the engine valves—the very spot!



The Copley Primer is Now Giving Complete Satisfaction to Thousands of Owners of Mitchell and Templar Cars, on which cars it is standard equipment

HOW IT WORKS



THE COPLEY PRIMER REALLY ATOMIZES

The proven principle on which the COPLEY PRIMER operates is one demonstrated to be correct through long years of use in various departments of the mechanical arts. Stated simply it is this: If a small stream of liquid (gasoline, for instance) is injected into a stream of air traveling at high velocity, the liquid will be finely atomized by the air—Make no mistake—Mr. Dealer, the Copley Primer does just this thing.

THE PRICE COMPLETE WITH FITTINGS IS $6.00

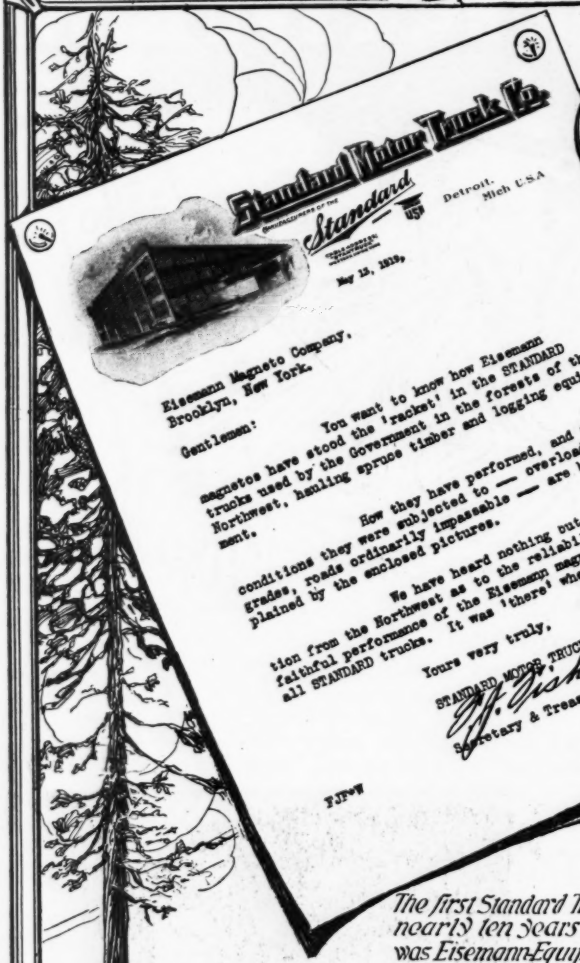
(Includes war tax)

Descriptive literature and quotations for the asking

BAY STATE PUMP COMPANY

102 Purchase St. BOSTON, MASS.

EISEMANN
MAGNETO


Standard Motor Truck Co.
Manufacturers of the Standard
Detroit, Mich. U.S.A.

May 12, 1913.

Eisemann Magneto Company,
Brooklyn, New York.

Gentlemen:

You want to know how Eisemann magnetos have stood the 'racket' in the STANDARD trucks used by the Government in the forests of the Northwest, hauling spruce timber and logging equipment.

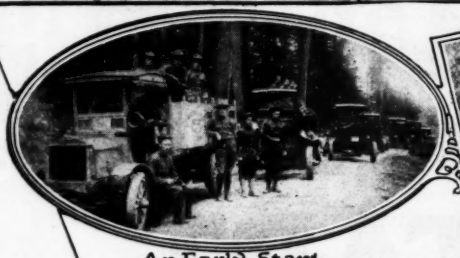
How they have performed, and the conditions they were subjected to — overloads, steep grades, roads ordinarily impassable — are best explained by the enclosed pictures.

We have heard nothing but commendation from the Northwest as to the reliability and faithful performance of the Eisemann magneto used in all STANDARD trucks. It was 'there' when needed!

Yours very truly,

STANDARD MOTOR TRUCK COMPANY.
W. H. Fisher
Secretary & Treasurer.

FJFW


An Early Start.

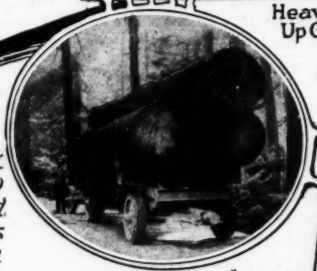

Hauling thru Virgin Forest.

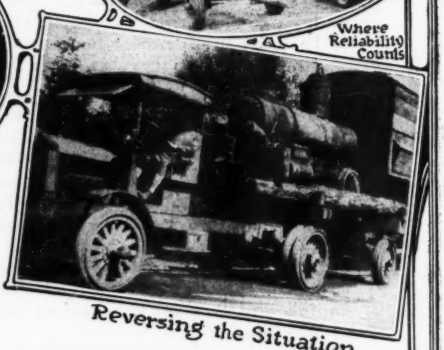

A Forest Giant


Any Old Road!


Heavy Haul Up Grade


"Some" Pull!


A Regular Load

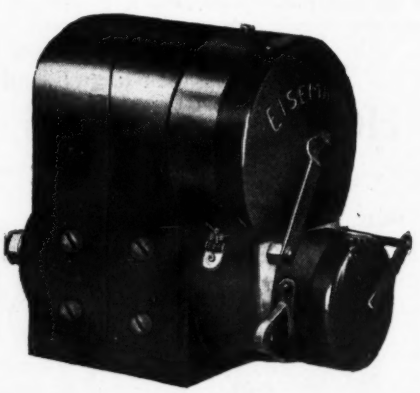

Where Reliability Counts

Reversing the Situation

The first Standard Truck nearly ten years ago was Eisemann-Equipped, and every one since has had an Eisemann under the hood.

In the remote logging camps, leagues from any community, a never-failing source of ignition must be assured.

Heavily loaded trucks, operating under the most severe conditions, on the roughest of roads, can always be depended upon when equipped with the sturdy and rugged Eisemann Waterproof Magneto.



THE EISEMANN MAGNETO CORPORATION

THE MARK OF PERFECT IGNITION

Plant and General Offices - 32 Thirty-third St., Brooklyn, N.Y.

CHICAGO - 910 S. Michigan Avenue
DETROIT - 85 Willis Avenue, West
LONDON, ENG - Stanley J. Watson, 37 Sheen Road



GILL
The Perfect One Piece Piston Ring

"Here Is the Piston Ring I Recommend"

The garage man says this with an accent of pride when he holds out a Gill Piston Ring towards the customer. He knows the Gill Ring only has to be shown to convince that it is the "perfect one piece piston ring." There is no argument necessary, one look at the double step interlocking joint and anyone with even the slightest mechanical knowledge can see that it is head and shoulders above any other ring on the market.

Just think for a moment. The Gill Piston Ring allows an expansion of from $1/8$" to $3/16$" without any loss of compression and at the same time has all the advantages of a one piece ring. Made from single piece castings of the finest gray iron and machined to absolute accuracy. The easiest ring on the market to install, the easiest ring on the market to sell.

Send for the new Gill Piston Ring Size Directory, complete, convenient, and full of just the information you need. It is free to the trade.

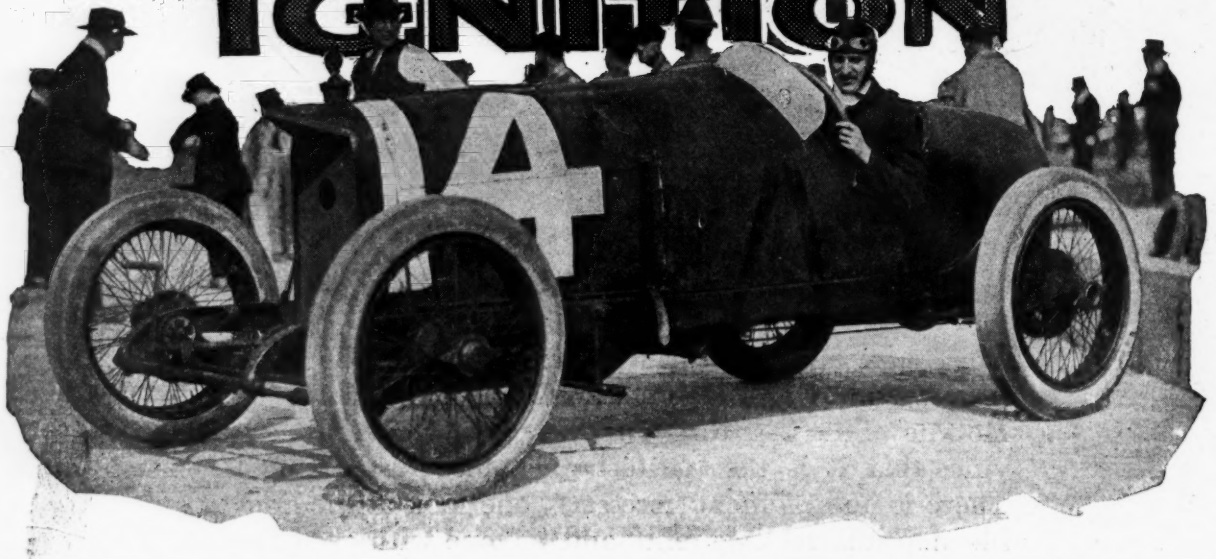
Dealers—Ask your jobbers about them
Jobbers—Write to us for information

The Gill Manufacturing Company
351 West 59th Street, Chicago, Illinois

Sole Foreign Agents:
AUTOMOTIVE PRODUCTS CORPORATION
Woolworth Building, New York, N. Y.

PHILBRIN

Reliable IGNITION



He Stayed with the Leaders All the Way—Both Times—Setting a New Record for 150 Miles

Ira Vail—Winning 2nd Place at Uniontown, Breaking the Record at Sheepshead—Claims Remarkable Performance Was Due to Philbrin Ignition.

The circle of race drivers who are discarding magneto ignition in favor of Philbrin, is rapidly widening. For Philbrin is producing eye-opening results that are winning amazed commendation from all who witness its performance.

Ira Vail, after the race at Sheepshead Bay on Sept. 20, dispatched this enthusiastic wire to the Philips-Brinton Co.:

"Philbrin Ignition demonstrates its lasting and sure firing ability by another non-stop grind for one hundred fifty miles getting third place, average speed, 105 miles. Used the original plugs that were used at Elgin and Uniontown."

He just missed second place by a breath—a matter of two seconds. Previous to that, on Sept. 1, at Uniontown, his car won second place against practically the same competition. At the conclusion of this race, Roscoe Sarles, the driver (Vail was nursing an injured arm), sent the following telegram:

"Drove Philbrin Special to-day. Finished second. **Am so pleased with Philbrin Ignition want duplicate of Vail's system sent to me care Wright Motor Co., 1002 Hope Street, Los Angeles, for my Roamer Race Car."**

The plugs, mind, were VETERANS—they were used at all three races. Yet not a single plug was fouled; each functioned perfectly in each gruelling run.

No driver who tries Philbrin can go back to a magneto —or to any other system. For that all-powerful, intensified, rending spark that will break through the heaviest film of oil, can be produced by none but Philbrin—the system that gave the world a new form of contact maker and condenser.

You can install Philbrin in place of any ignition system you are now using. Write for descriptive data.

Philips-Brinton Company

505 South Broad Street Kennett Square, Penna.

PHILBRIN TRADE MARK

Presto Products



Winter Profit Boosters

The demand for these three Presto winter necessities will soon be at its height. Now is the time to place your order to avoid missing any sales. Begin right now to prepare for a "bigger than ever" winter business.

Electric Heater

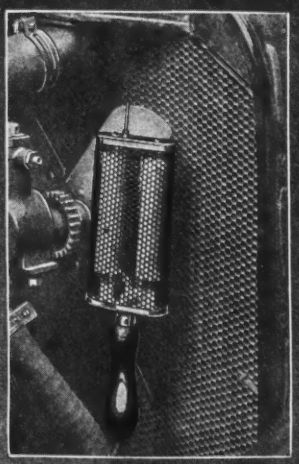
At night simply screw the plug into the nearest electric light socket, put the Presto Heater under the hood and be assured of a warm and easy starting engine in the morning.

Here Are Three Big Features

Easy Starting—Keeps the engine manifold and radiator warm during the night, making starting as easy as in warm weather.

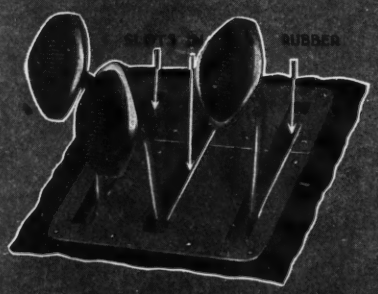
Safety—There is absolutely no danger of fire, as where flame heat is used.

Economy—Delivers the heat exactly where it is wanted—inside the hood. It is far cheaper to heat the engine than to heat the entire garage. Price, $4.50



All-Weather Protector for Ford Cars

A necessity for Fords in winter or summer. In cold weather it prevents cold air from entering through the pedal slots in the footboards. In summer it shuts out engine heat and keeps the front compartment comfortably cool.

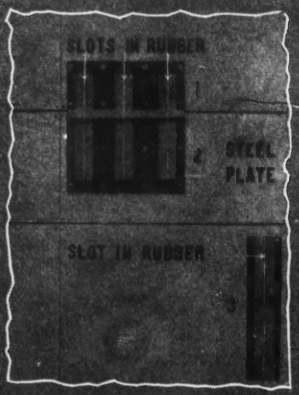


Body Brace for Ford Cars

Stops vibration—avoids sagging of running boards and prevents breaking away from fenders—prevents broken springs—**prevents uneven strain**—holds drive shaft in position—holds all mechanical parts in alignment—equalizes spring action—easily installed, no holes to drill, no mechanic necessary.

Price only $3.50 in U. S. A. except west of Rockies $4.00. In Canada $6.00.

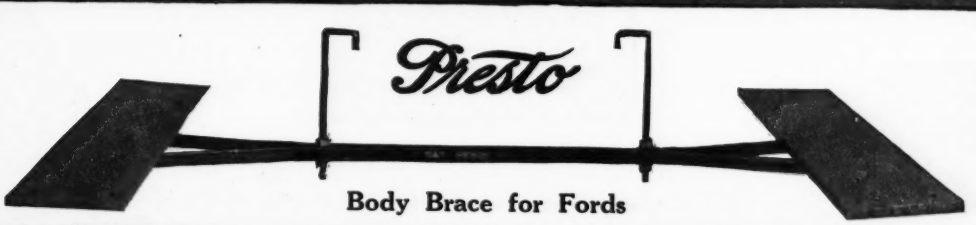
The complete Presto line includes over 100 motor car necessities. Write for catalog and complete information.



METAL SPECIALTIES MFG. CO.
338-352 N. Kedzie Ave., Chicago

Eastern Branch:
16-24 W. 61st Street, N. Y.

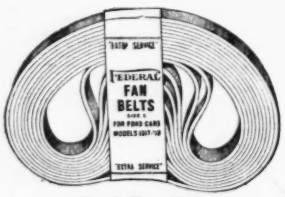
Western Branch:
149 New Montgomery St.,
San Francisco



Body Brace for Fords

FEDERAL

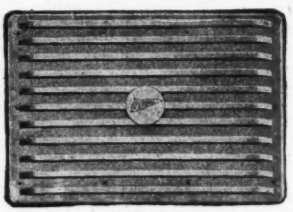
Accessories and Repair Materials



Ford Fan Belt



Repair Gum



Safety Step Mat

THE Federal line of automobile accessories and repair materials is unusual for its high quality, completeness and long service.

It is, therefore, a representative, highly desirable and profitable line for dealers to handle.

Only a few of the items comprising the entire line are shown here, but we shall be pleased to send complete catalog, prices and discounts to the trade on application.



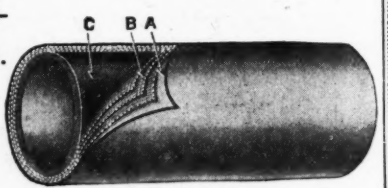
Combination Hook-On-Lace-On Boot



Reliner



Inside Sleeve



Radiator Hose



Ford Mat



Para-tite Repair Material



Sealtite Repair Material

THE FEDERAL RUBBER COMPANY
OF ILLINOIS
Factories, Cudahy, Wisconsin

Manufacturers of Federal Automobile Tires, Tubes and Sundries, Motorcycle, Bicycle and Carriage Tires, Rubber Heels, Fibre Soles, Horse Shoe Pads, Rubber Matting and Mechanical Rubber Goods

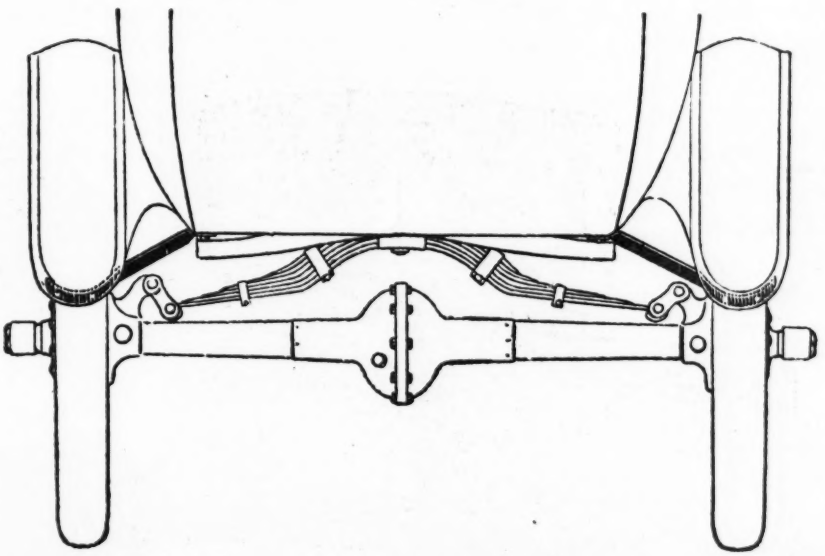
Two Important Announcements To The Trade

1.—Reduction in Price of DUNN'S Counterbalances for Fords

Because of the big increase in demand for DUNN'S Counterbalances, we have greatly increased our manufacturing facilities and output. It is now possible for us to produce these counterbalances at a lower price. Taking effect immediately, the list price of DUNN'S Counterbalances for Fords will be $8.00 instead of the former price of $12.00. To every dealer in this country this is an important announcement, as it will mean greatly increased business for every merchant who sells this product that is proving so successful after being on the market for three years. If you are not already selling DUNN'S Counterbalances for Fords, get in touch with us at once. At the new price our proposition is more attractive than ever.

2.—A New Product: The Dunford Rear Fender Brace

$1.00 Per Pair



Prevents Breaking *of* Fenders

Whipping and vibrating of Ford fenders soon causes them to crack and break. This means an early replacement at a cost of $4.75 per fender. This condition is now eliminated by the brand new Dunford Rear Fender Brace. This brace holds the fender firm and secure at all times. It stops squeaks and rattles and does away forever with all rear fender troubles. It lasts as long as the car. Simple and easy to attach. Anyone can put them on. They retail at $1.00 per pair. Your profit on each sale is very liberal. *Get in touch with us for full particulars.*

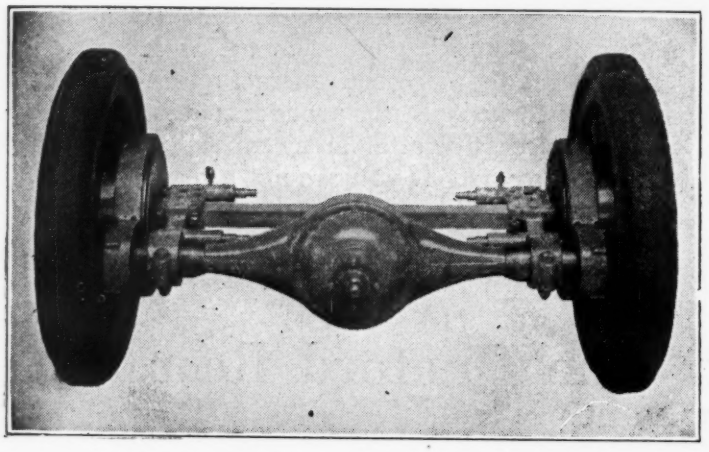
DUNN MANUFACTURING CO., Clarinda, Iowa

Reliance

EVERY INCH WORTHY THE NAME

MOTOR TRUCKS

The time for every dealer who is going to sell motor trucks in 1920, to make his selection, is now. Later it may be difficult, or even impossible, for him to represent the kind of truck he knows will bring success. Begin investigations right now. Make up your mind to play safe next year. Take on a truck that is firmly established, a truck that has passed the experimental stage.



The Badger External Gear Axle Is Used On All Models

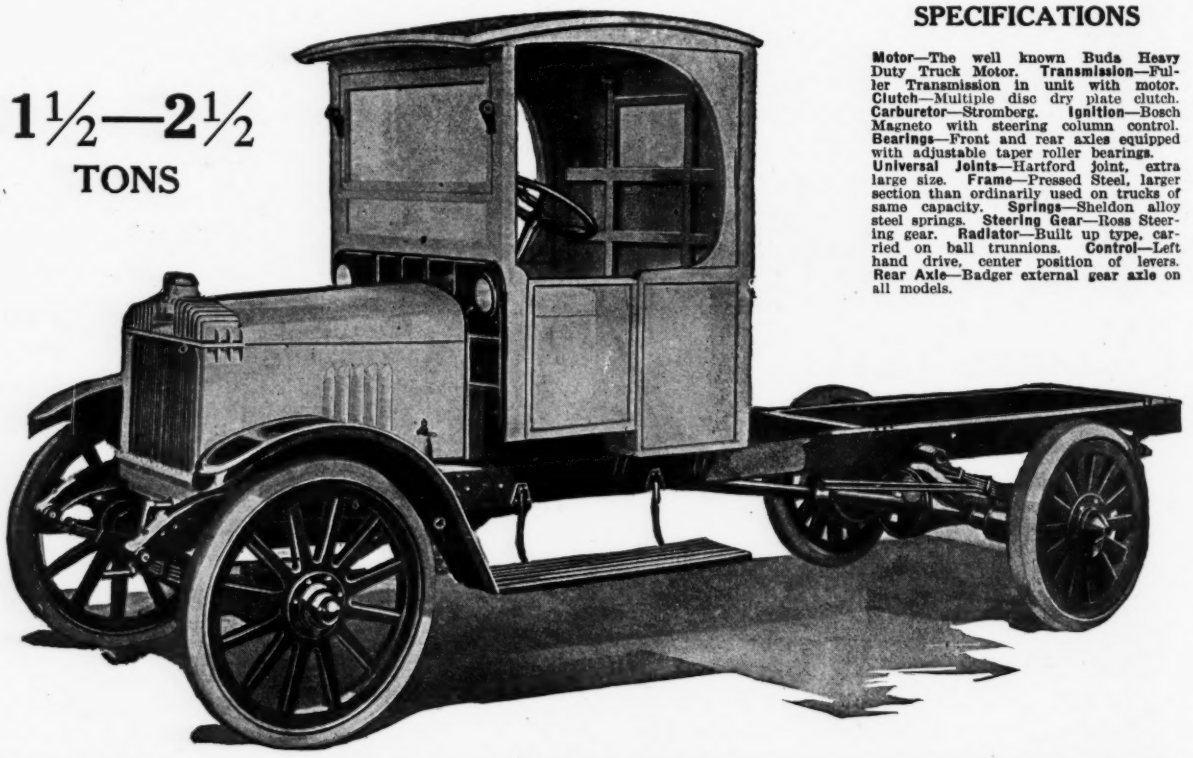
RELIANCE Trucks have been built for ten years. That, in itself, is a recommendation. They have always been good trucks—the new models reflect the best that has been developed in the motor truck industry.

Write for details of our sales plan

RELIANCE MOTOR TRUCK CO.,

Appleton, Wisconsin

1½—2½ TONS

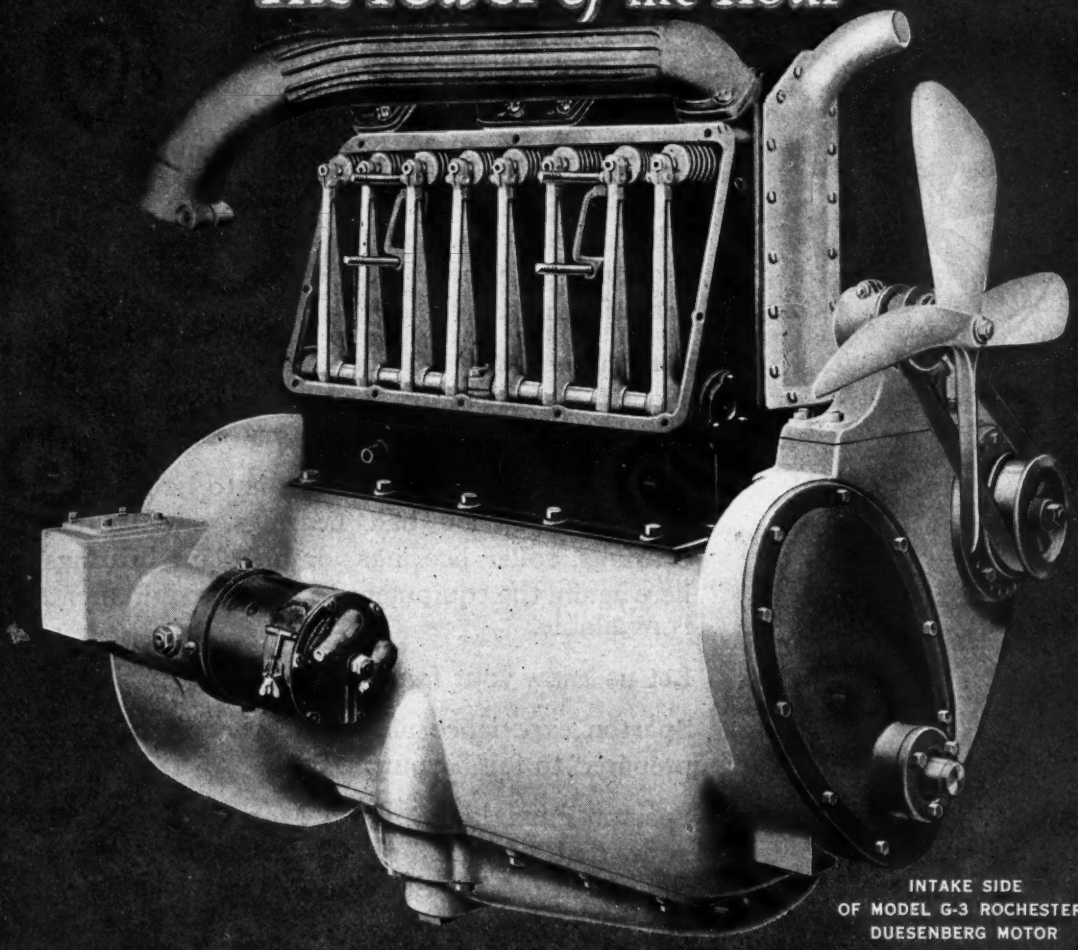


SPECIFICATIONS

Motor—The well known Buda Heavy Duty Truck Motor. **Transmission**—Fuller Transmission in unit with motor. **Clutch**—Multiple disc dry plate clutch. **Carburetor**—Stromberg. **Ignition**—Bosch Magneto with steering column control. **Bearings**—Front and rear axles equipped with adjustable taper roller bearings. **Universal Joints**—Hartford joint, extra large size. **Frame**—Pressed Steel, larger section than ordinarily used on trucks of same capacity. **Springs**—Sheldon alloy steel springs. **Steering Gear**—Ross Steering gear. **Radiator**—Built up type, carried on ball trunnions. **Control**—Left hand drive, center position of levers. **Rear Axle**—Badger external gear axle on all models.

Rochester Duesenberg

The Power of the Hour



INTAKE SIDE
OF MODEL G-3 ROCHESTER-
DUESENBERG MOTOR

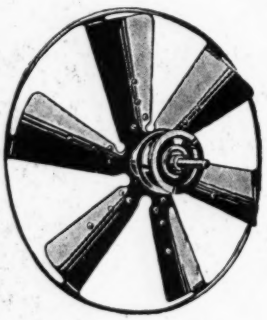
The Master Motor built by the Master Builders
A Better Engine built in a Better Way

ROCHESTER MOTORS COMPANY, INC.
ROCHESTER, N. Y., U. S. A.

© 1919, REX. W. WADMAN, INC.

SPARTON
Cooling Unit

A Sparton For Every Fan Requirement



The fan problem is coming in for more serious consideration.

With keen competition in car designing, cooling requirements vary widely.

The type of fan, and the kind of bearing for mounting it, depend on the requirements of the manufacturer.

But, no matter whether a two-bladed, four-bladed, six-bladed or even an eight-bladed fan is required, the Sparton factory can supply it.



Regardless of whether the fan is to be mounted on cup and cone ball bearings, annular ball bearings, roller bearings, or on plain bearings, here again, the equipment to fit the requirements is available.

Let us know your fan and fan bearing problems.

Sparton experience and Sparton equipment are prepared to fulfill your needs.

Sparton Fans, like Sparton Motor Horns, Radiators and Vacuum Feed Systems, are standard equipment on America's best cars.



The Sparks-Withington Company
Jackson, Michigan, U. S. A.

SAFETY FIRST SOUND SPARTON

(144)



She's Using KNEUTOP

To Waterproof the Old Top, Preserve it and Restore the Original Sheen

After a car has been out in the sun a few weeks and has weathered a few rain storms, gathered dust and mud, the top loses the original sheen and that "new look."

Some discolor and fade, other materials take on a dull, dead look entirely **out of keeping with the body of the car.** Shallow spots develop in the top and it begins to leak, the leather cracks and blisters. Pretty soon the top is the source of considerable abuse and dissatisfaction.

Apply KNEUTOP early in the season and it will prevent these annoyances.

KNEUTOP can be used on leather or imitation leather and mohair. It **weather-proofs while it cleans,** and a single application will restore the original sheen and color of the top and protect it for the future.

Just as many car owners put up their cars for seasonal overhauling—so thousands of them spend $1.25 for a quart of KNEUTOP and apply it before it has an opportunity to fade or leak.

KNEUTOP is a liquid dressing that dries rapidly, will not catch the dust and dirt and has the same effect on a top as a water-proofing process has on ordinary textiles. It closes up any infant pores or cracks and locates the weak spots in the top and strengthens them.

It is guaranteed by us to our dealers to do all we claim for it and we expect the dealer to extend the same business courtesy to his customers.

Easy to apply—most economical in the end.

KNEUTOP is supplied in mailable containers, with full directions for use.

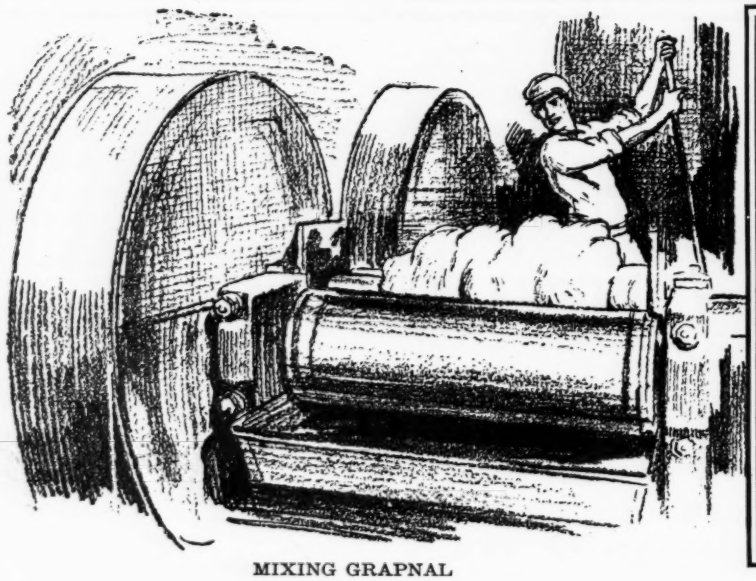
Retails at

$3.25 a gallon **$1.75 a half-gallon** **$1.25 a quart**

Manufactured solely by

The Western Reserve Varnish Co.

1251 Marquette St. **Cleveland, Ohio**



MIXING GRAPNAL



Ordinary woven lining

Notice the loosely woven texture.

Wears down quickly and unevenly.

Loses its gripping power as it wears.

Thermoid Hydraulic Compressed Brake Lining

Notice the compact texture.

Wears down slowly.

Gives uniform gripping surface until worn wafer thin.

The only brake lining that is *"Grapnalized"*

An exclusive process

One of the most dangerous defects which a brake lining can possess is its inability to resist moisture.

Moisture from any source—rain or water as well as oil and gasoline, causes cheap linings to become swollen and "mushy," which makes them slip and grab. Automobile accidents due to failure of the brakes can in almost every case be traced directly to this cause. Woven linings absorb a large quantity of moisture.

Every foot of Thermoid Brake Lining is subjected to the special process of *grapnalizing* which makes it impervious to water, oil, gasoline, dust, etc. Thermoid is absolutely moisture proof.

What *Grapnal* is

Grapnal is a special compound, discovered and used exclusively by the makers of Thermoid Brake Lining. The special formula by which ***Grapnal*** is made contains ingredients which have great moisture resisting properties.

The asbestos fabric is thoroughly impregnated with ***Grapnal*** Under hydraulic pressure and terrific heat, ***Grapnal*** becomes an integral part of the brake lining.

Satisfaction and future patronage for Thermoid dealers

Thermoid is the 100% lining by virtue of the exclusive processes under which it is made.

It has proved best by test in the scientific laboratory as well as by use over thousands of miles of road.

Many of the motor transports in Pershing's army were equipped with Thermoid which proved "responsible" in every critical emergency and which stood unlimited wear and tear.

You owe it to your trade to sell Thermoid—it insures satisfied customers and means a permanent, increasing business.

Every foot of Thermoid is backed by the famous guarantee: ***Thermoid will make good—or WE WILL.***

Thermoid Rubber Company

Factory and Main Offices: Trenton, N. J.
New York, Chicago, San Francisco, Detroit, Los Angeles, Philadelphia, Pittsburgh, Cleveland, Boston, London, Paris, Turin.

Canadian Distributors
The Canadian Fairbanks-Morse Co., Limited, Montreal
Branches in all principal Canadian Cities

Thermoid Brake Lining

Hydraulic Compressed

Makers of "Thermoid-Hardy Universal Joints" and "Thermoid Crolide Compound Tires"

Sound Reputation



Here and there motor truck, tractor and automobile engineers and manufacturers will gather.

And they sometimes discuss transmissions.

When Covert Transmissions are mentioned the ensuing comment is unanimously favorable.

In fact, Covert Transmissions are invariably referred to as a standard among transmissions.

Such is the reputation for performance of Covert.

It will always be maintained.

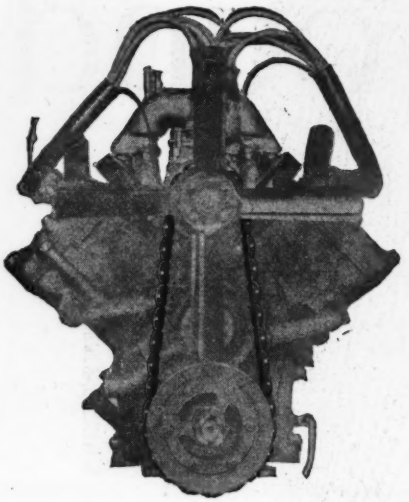
Covert Gear Company, Inc.
Sales Engineering and Service
967 Woodward Avenue Detroit, Michigan

Factory: Lockport, N. Y.
Export Office: 100 Broad Street, New York

"There is No Weak Point in a Covert"

COVERT TRANSMISSIONS

It Drives the Fan That Cools the Cole Engine



The Link "V" Fan Belt on a Cole Motor. It's noiseless.

EVERY Cole car that leaves the factory is equipped with a G & K Link "V" Belt. It is regular equipment on that car. The Link "V" was written in the specifications by the Cole Motor Car Company after exhaustive tests that showed undeniably its superiority.

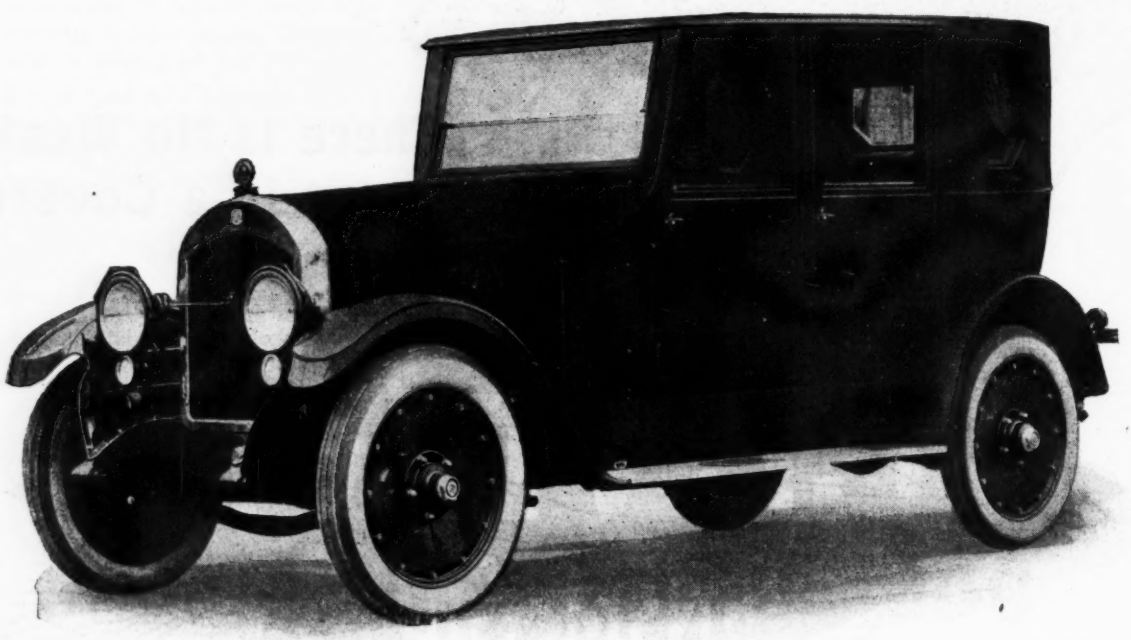
The G & K Link "V" is a combination of steel, fibre and leather links so constructed that the strain is borne by the steel and fibre links, the leather links furnishing the necessary frictional surface. It possesses great strength, in fact, is practically indestructible, often outlasting the car under ordinary use.

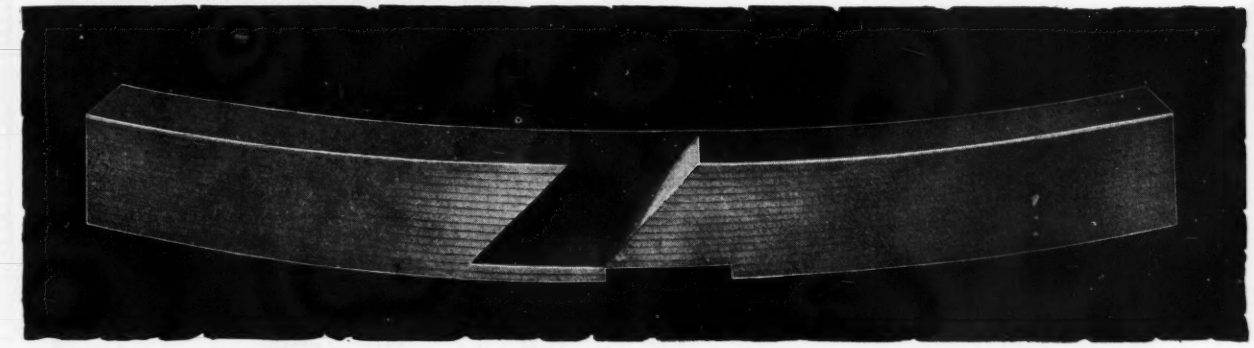
Further information regarding the Link "V" gladly furnished

The Graton & Knight Mfg. Co.

Automotive Equipment Division

WORCESTER, MASS.





PERMASEAL

PATENT ONE-PIECE PISTON RINGS

"Oil and Gas Tight"

The Patent, Interlocking, Dovetailed Joint Seals the Wall of the Cylinder and the Groove of the Piston

The exclusive Permaseal Interlocking Dovetailed joint is the greatest single advance in the history of piston ring construction.

They increase compression, because all the power of the explosion is kept in the chamber. None leaks through.

Made in one piece of fine, close-grained, tough grey metal, individually cast—Permaseal patent one-piece rings are always resilient and the rings always maintain an even pressure all around against the cylinder walls.

The surface of Permaseal rings is turned, not ground, and therefore they seat quickly and easily, requiring no lapping in.

The Patent Permaseal Interlocking Dovetailed Joint remains oil and gas tight even though the gap or joint is open ⅛ of an inch.

They fit the grooves properly—no up and down play.

Send for a trial set today. Try them in any motor, and prove their superiority yourself. Money back if you're not satisfied.

Permaseal Patent One-Piece Piston Rings are the fastest-growing on the market. The business is there in your territory. Get it. Jobbers and dealers everywhere are arranging to feature these rings.

GRUNDY MANUFACTURING CORPORATION

690 Meldrum Ave., DETROIT, MICHIGAN



THE "TIMESAVER" PISTON RING FITTER Automatically prevents filing at wrong angle. Saves time and effort, eliminates breakage, and lasts forever.

Pays for itself in the fitting of one set of piston rings. Price complete, $2.00 each.





PERMASEAL PATENT ONE-PIECE PISTON RINGS are furnished with Oil Groove, for exceptionally bad oil-pumping motors, at no extra cost. Specify whether you want "Regular" or "Oil Groove" type when ordering.

The Scissors Test Proves That Norwalk Tubes Do Not Rip

1. Neither blow-out nor puncture can destroy a tube which will not rip.

2. Cuts remain little, clean-edged holes, which can be easily repaired.

3. Norwalk Tubes are guaranteed not to rip as other tubes.

Norwalk Tubes, both red and gray, set a new standard—floating stock.

File away a dated sample of Norwalk Tube and others and compare them at the end of a year.

Norwalk Non-Skid fabric and cord Casings are just as good as Norwalk Tubes.

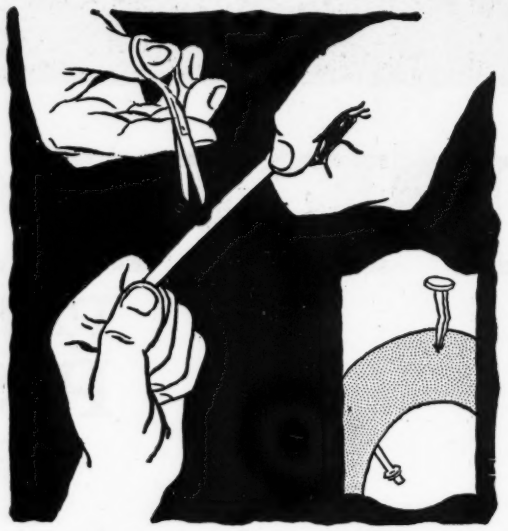
NORWALK TIRE & RUBBER CO.
Makers of Casings, Cord and Fabric; and of Tubes, Red and Gray
NORWALK, CONN.
Export Office: 100 Broad Street, New York

DEALERS If the tubes you are now selling do not meet the Norwalk scissors test, better stock Norwalks at once. This advertisement is one of a series in which we are telling the public how to test tubes before they buy.

Cord Casings Adjusted 8,000 Mile Basis



THE SCISSORS TEST
Take sample piece of tube ¼ in. by 3 in. Stretch to 9 in. or three times its original length. Cut on the edge with the scissors. The cut should not be more than ⅛ in. across the sample. If the strip tears apart the rubber is inferior.



Stretched, as in the tire, good tubes do not rip when cut. They cut but do not rip.



The slightest cut in an inferior tube—Rip! and the tube is ruined. Make your dealer prove that the tube he sells will stand the Norwalk test.

NORWALK
TUBES and CASINGS



MULTIBESTOS

The most complete Literature ever offered by a Brake Lining Manufacturer

Instructive material for the jobber and his salesmen — valuable suggestions for the garage and repair man — points of interest for the car driver — all are covered by the MULTIBESTOS Library of booklets and folders.

This literature gives to dealer and jobber the detail points on Multibestos. The general story of its merit is being told in regular advertisements in the Saturday Evening Post, Collier's, and The Literary Digest.

These booklets take up the subject of stopping and starting, and the need of the best brake lining and clutch lining. Most of them are furnished with the imprint of jobber or dealer. This is just one part of the MULTIBESTOS plan of trade help and cooperation.

STANDARD WOVEN FABRIC CO. **Factory, Walpole, Mass., U. S. A.**

ELCAR



Five Passenger Touring Car

Again the Elcar Has No Rival in the Medium Price Field

In the 1920 models of the ELCAR we present, as we have for many years, the most reasonably priced fine cars made.

For size, beauty, comfort, power and excellence and sturdiness of construction the ELCAR has consistently and continuously led in high value at lowest cost.

Never faddish or freakish in style, the ELCAR appeals to buyers who have a sense for true artistic values and who have intimate knowledge of automobile construction.

Our line is complete—touring cars, sportsters, coupes and sedans. Our closed cars, as well as the beautiful roomy bodies of the open models, reveal the skill developed in our forty-seven years' experience as builders of fine vehicles.

The cars are amply large, 116 inch wheelbase. Four-cylinder models have the powerful long stroke ELCAR-Lycoming motor, developing 37½ horsepower. Six-cylinder models have the remarkable new 7-R Red Seal Continental motor, developing 55 horsepower at peak. Aside from the power plants the Fours and Sixes are identical; Delco two-unit electrical system. Willard batteries. Latest Stromberg vertical carburetors. Borg & Beck clutch. New type, floating, Salisbury pressed steel rear axle. Spiral bevel driving gears, Timken and Hyatt bearings. Muncie transmission, tubular propeller shaft, two universals. Wonderfully easy riding, semi-elliptic springs. Truly luxurious upholstering. 33x4 tires, non-skid rear. Duplex lamps. Walnut instrument board. Equipment complete even to Boyce Moto-Meter on radiator.

Dealers who appreciate the unique selling quality and prestige of the ELCAR should write or wire concerning territory.

Five Passenger Touring Car

Model D-four .....$1395 Model D-six $1595

Four Passenger Sportster

Model H-four .....$1395 Model H-six $1595

Three Passenger Coupe

Model K-four .....$1995 Model K-six $2195

Five Passenger Four door Sedan

Model G-4 .....$1995 Model G-six $2195

Elkhart Carriage and Motor Car Co., 781 Beardsley Ave., ELKHART, IND.

It Is Not Now a Question of Selling Radiator Guards, But Rather a Matter of Selecting THE MOST EFFICIENT TYPE

THE Warman Radiator Guard for trucks is the *one* highly efficient *double barrier* between the fragile core and the destructive effects of collisions and contact with wagon poles, rods and other projecting menaces.

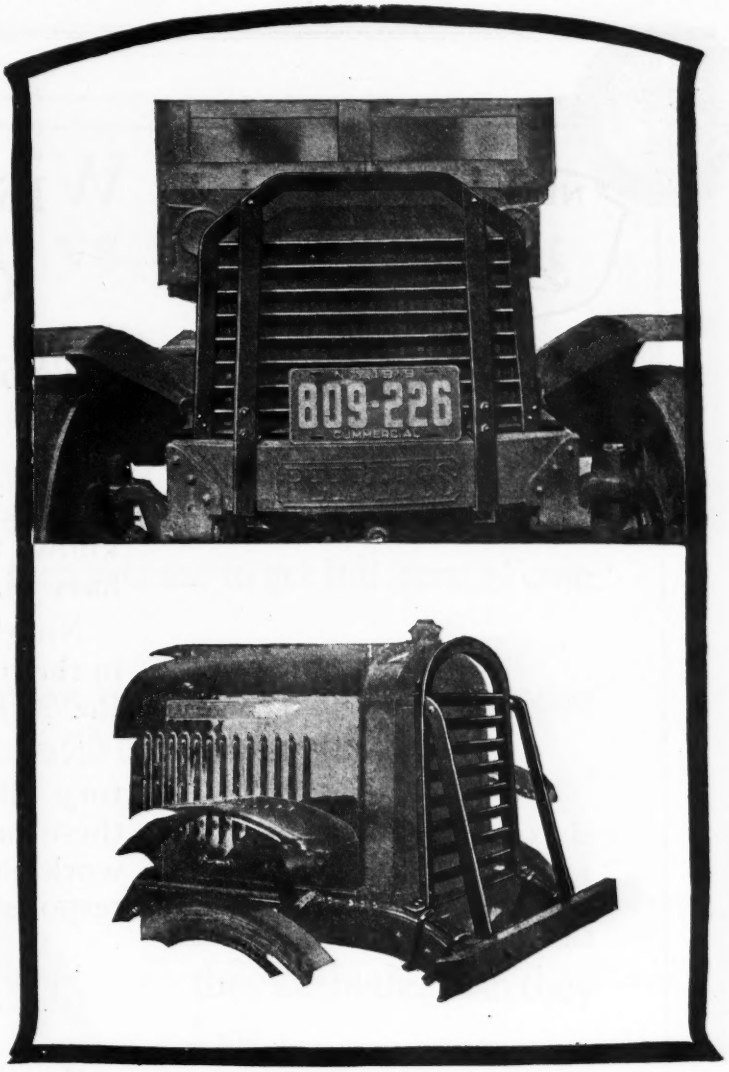
We illustrate its construction here.

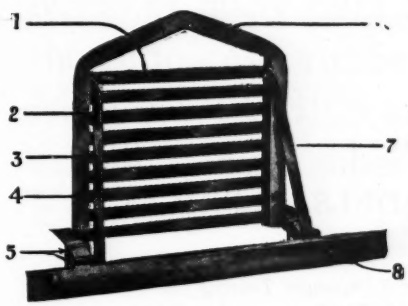
Your own good judgment will at once discover its points of basic design, including the front braces and 45 degree bars.

You can offer the Warman Guard in the full assurance that it will stand firm against any ordinary collisions—that if the brace *does* deform it will pull the guard *away* from the radiator—and that no projection of any description can get by the heavy steel bars.

Your territory is filled with truck owners who would rather pay $25 or $30 for protection than run the constant risk of a radiator accident that will lay the truck up for days and weeks and that will also cost good money for repairs or a new radiator.

And now consider this. We deal direct with you. Your commissions on sales of Warman Radiator Guards are therefore big enough to make you get out and hustle after the profits involved. Let us get together. Write.





1. **LATERAL BARS**—Set at angle of 45 degrees to permit free radiation and give maximum resistance and protection.
2. **STEEL FRAME**—1¾x1¾x3/16 angle.
3. **STEEL FORWARD BRACE**—1¾x⅜.
4. **STEEL LATERAL BARS**—1¾x⅜.
5. **½ IN. U-BOLTS**—Clamp attachment to spring horn of chassis. Put on in a few minutes with ordinary wrench.
6. **SHAPE OF GUARD**—Differs to conform to radiator frames of various makes of trucks. Gives attractive uniform appearance.
7. **FORWARD BRACE**—Does not interfere with hood. Force of blow taken up by weight of chassis. Direct blow on brace pulls guard away from radiator instead of driving it in, as with a rear brace guard.
8. **BUMPER**—Attached to guard, optional ($5.00 additional).

THE FUNDAMENTAL CORP.

270 Union Ave., Brooklyn, N. Y.

New York Sales Office, 1777 Broadway, New York

The WARMAN RADIATOR GUARD

Patented WARMAN Radiator GUARD FUNDAMENTAL CORP'N

NEW Mitchell SIXES

Our New Victory Model
Wins for Dealers

Wise Dealers Think of the Future

So the New Mitchell Sixes Gain in Esteem

Hundreds of Dealers have come to know the Mitchell ideals — hundreds have visited the factory.

No greater evidence of Mitchell's place in the future is afforded than by observing the Mitchell community at work.

New standards — exacting tests — factory efficiency — perfected machinery — these have brought a new spirit. Every workman, tester and inspector feels his responsibility.

Dealers Who Look Ahead

When today's conditions are changed — when old-time competition returns — only the finer cars in each class will win the major sales.

Mitchell has strategized to win and hold its place. This, together with our future plans, means a stabilized and growing business for Mitchell Dealers. It means protection in the coming days of shifting favorites.

Don't judge the future by today's market conditions. Plan ahead.

There are a few openings in choice territories for Mitchell Dealers. Write to find out if your territory is open and for our new plans.

MODELS and PRICES

$1690 at Factory
For 5-Passenger Touring Car
120-Inch Wheelbase—40 h. p. Motor
3-Passenger Roadster same price
Also built as Sedan and Coupe

$1875 at Factory
For 7-Passenger Touring Car
127-Inch Wheelbase—48 h. p. Motor

MITCHELL MOTORS COMPANY, Inc.
Racine, Wisconsin

Trade Mark vs. Mint Mark

A tire is a "medium of exchange" of your money for mileage. The standard of value of a QUAKER TIRE is decidedly more fixed than the value of the American dollar. For this reason you are far more certain to get one hundred cents value from a QUAKER than you are to get full from a "coin of the realm".

The QUAKER trade mark is your guarantee of service and satisfaction for it means "Miles Cheaper".



QUAKER MULTI-TUBES are the best looking tubes made, and they are better than they look.

Made of many plies of the choicest rubber, MULTI-TUBES are actually "many tubes". Economy says, "Try one".

Look up the Quaker Tire dealer in your locality. He will treat you right.

QUAKER CITY RUBBER CO.

Manufacturers of Auto Tires and Inner Tubes, also Mechanical Rubber Goods

PHILADELPHIA	CHICAGO	PITTSBURGH	NEW YORK
629 Market St.	182 W. Lake St.	211 Woods St.	53 Murray St.



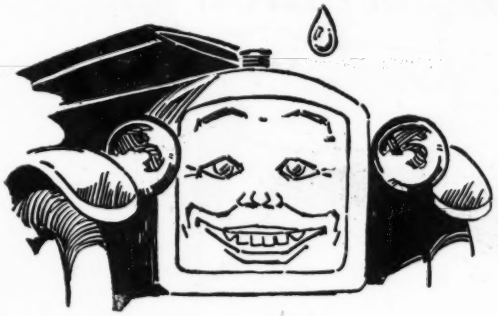
LAFAYETTE

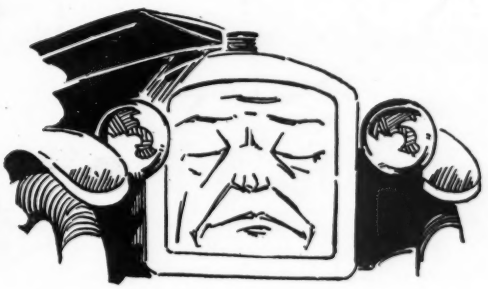
A new motor car has been created by men whose names are closely linked with the development of fine automobiles both in this country and in Europe. This car, to be available later, will bear the name—LAFAYETTE

LAFAYETTE MOTORS COMPANY
at *Mars Hill*, INDIANAPOLIS



Don't make "Dope Fiends" of Cars





Why Mr. Lucy Instructed the Purchasing Department of the Sterling Motor Company to Have OPCO on Hand at All Times.

"A trial which I recently made of your OPCO carbon remover may be of interest to you.

"The valves in my car were badly clogged with carbon and I delayed attempting to clean them because of the fact that I contemplated having my car thoroughly overhauled in a few weeks. I put some of your OPCO carbon remover in and the improvement was most marked.

"I am instructing our Purchase Department to place an order with you for some of this remover in order that we may have it on hand at all times."

Laws prevent the sale of drugs that make human wrecks. There's no law to prohibit the sale of dangerous carbon cures containing acids or other harmful chemical ingredients. Yours is a moral obligation. OPCO protects your conscience just as amply as it protects your profits.

NOTHING TO ATTACH—NO LABOR—NO CAR DISFIGUREMENT

OPCO is an oil. It penetrates, softens and loosens the carbon. Carbon is blown out through the exhaust when the motor is started. OPCO leaves the engine ideally lubricated. It is the quickest, safest, simplest, cheapest method known. You sell OPCO—minus the fuss and feathers of service and time-consuming explanations.

AUTHORITATIVE AUTOMOTIVE ENDORSEMENTS PLUS SUBSTANTIAL PROFITS

The OPCO folder contains impressive endorsements from Buick, Chevrolet and Peerless executives; from the Russel Motor Axle Co., Sterling and Curtiss Motors Cos., and other unquestionably high sources.

Your profit from OPCO is big and substantial. Get our money-making offer NOW!

WORLD OIL PRODUCTS COMPANY

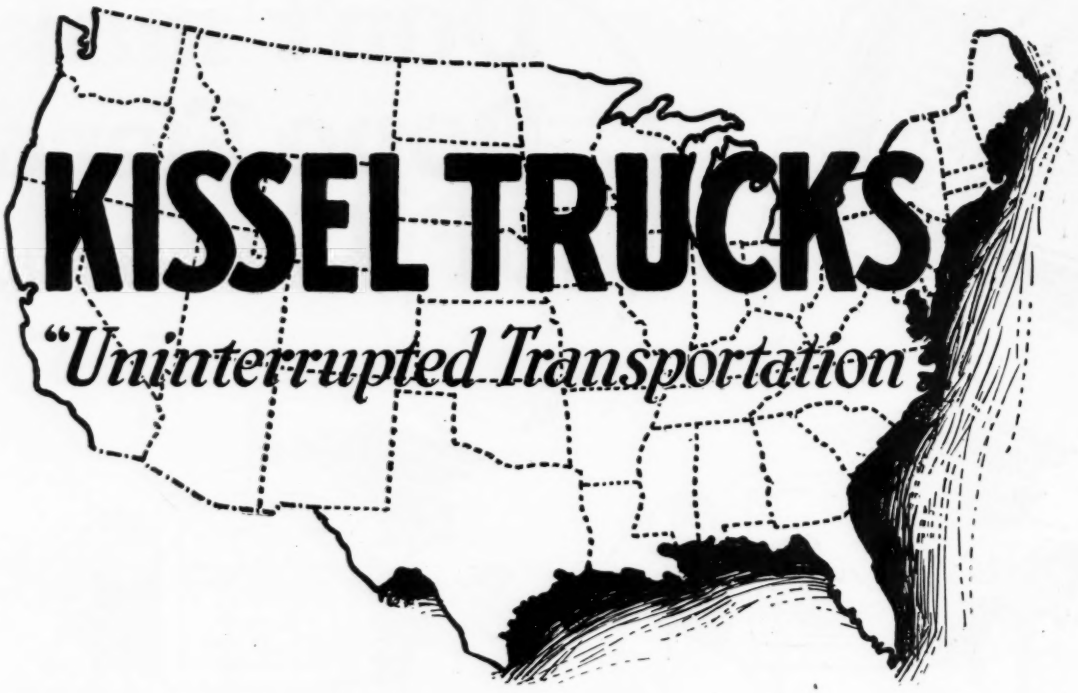
309 Lafayette St., New York City

WIDE AWAKE DEALERS

STOCK OPCO

The Oil That Removes Carbon

Opinions of OPCO No. 1



For Agricultural America

KISSEL truck engineers have made a special study of farm truck requirements—gaining an intimate knowledge of the obstacles to be overcome by trucks on farms—enabling them to construct, design and build a Kissel Truck to fit farm requirements as if especially designed to meet them and resulting in the following three Kissel truck models standing out so prominently as the logical trucks for farmers and dairymen to use.



The **"General Delivery"** truck ¾ to 1 ton capacity—a reliable light delivery truck with ability to carry capacity loads at a good rate of speed, equipped with many notable features for farm use, such as 8 foot loading space, unusually large tires, heavier transmission, new and decidedly heavier axles and enclosed seat.

"General Utility" model, chassis capacity including body 4600 lbs.—the farmer's choice for general hauling purposes, transporting supplies, produce, dairy products between farm, city and shipping points. A powerful truck and a good traveler.

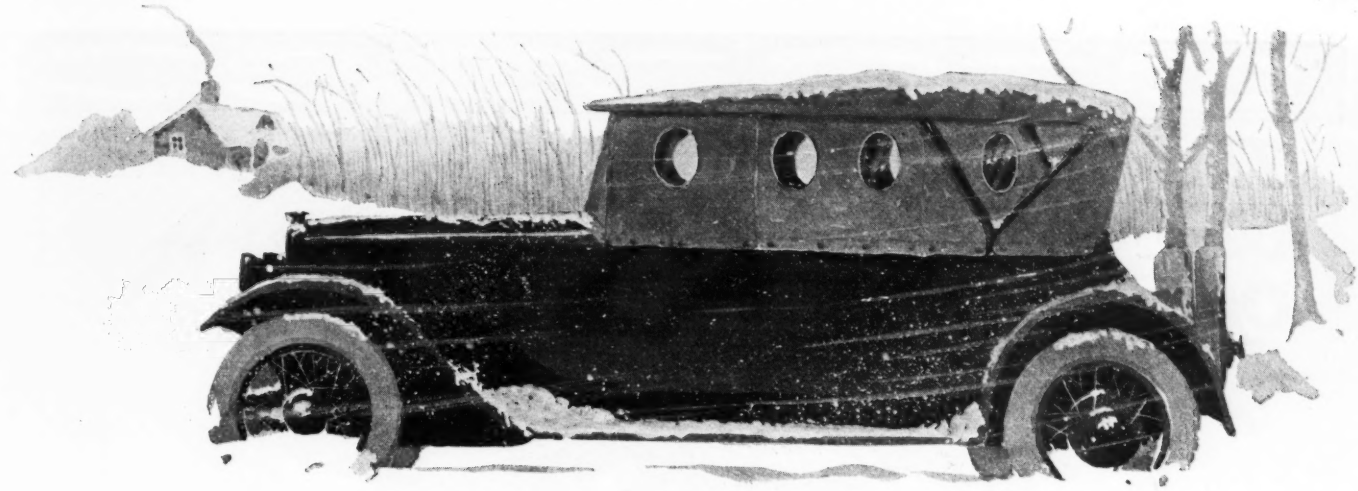
The **"Freighter"** model—the masterpiece of the two ton field, that comes nearer in performance and ability to the 2 ton U. S. Army "A" truck than any other truck on the market. Farmers, overland transportation companies and road builders find this model the leader in power, dependability and economy.

The other two Kissel truck models are the **"Heavy Duty"** with a chassis capacity including body of 8600 lbs. and the **"Goliath"** model with chassis capacity including body of 11800 lbs.

It is due to this intimate knowledge of the farmer's transportation requirements that Kissel trucks have become synonymous with ***Uninterrupted Transportation in Agricultural and Industrial America.***

There is a Kissel dealer in all principal cities. For Kissel franchise particulars write direct to factory.

KISSEL MOTOR CAR COMPANY, Hartford, Wisconsin



—and the Radiator Didn't Freeze!

Out all night in the wintry, frost laden air—standing for hours with the motor dead—while biting north winds and whirling snow did their best to cripple the cooling system—*and the radiator didn't freeze!* Extraordinary, to say the least, but such cases became common during the many tests made to determine the efficiency of

G&F Freeze-Not

Prevents Frozen Radiators and is Guaranteed to be Non-Injurious to Metal or Rubber

In every test made—and many were made in severe northern climates—G. & F. Freeze-Not came through with flying colors. It demonstrated beyond all doubt that it is a thoroughly reliable, efficient frozen radiator preventive.

G. & F. FREEZE-NOT is made up of four ingredients and we positively guarantee that none of these ingredients is injurious to rubber, copper, zinc, aluminum, iron or any metal. We do not merely claim this, we guarantee it. As a matter of fact, two of the ingredients are used to **preserve** metal and rubber.

G. & F. FREEZE-NOT will not freeze in any weather, will not overheat or boil over, will not deteriorate and will not injure the paint on hood or radiator if spilled.

One filling is enough for entire winter.

Now is the time to get in your order. Have G. & F. FREEZE-NOT on hand when the first cold weather comes along. Don't overlook any bets—don't miss any profits.

Dealers and jobbers all over the country are stocking G. & F. FREEZE-NOT. Dealers who sold it last winter wouldn't sell anything else this winter. Let us refer you to some enthusiastic users in your territory.

Wire or write for our proposition.

G. & F. PRODUCTS CO.

1314 Twelfth Street, Rock Island, Illinois.

G. & F. Products Co.
1314 Twelfth St., Rock Island.

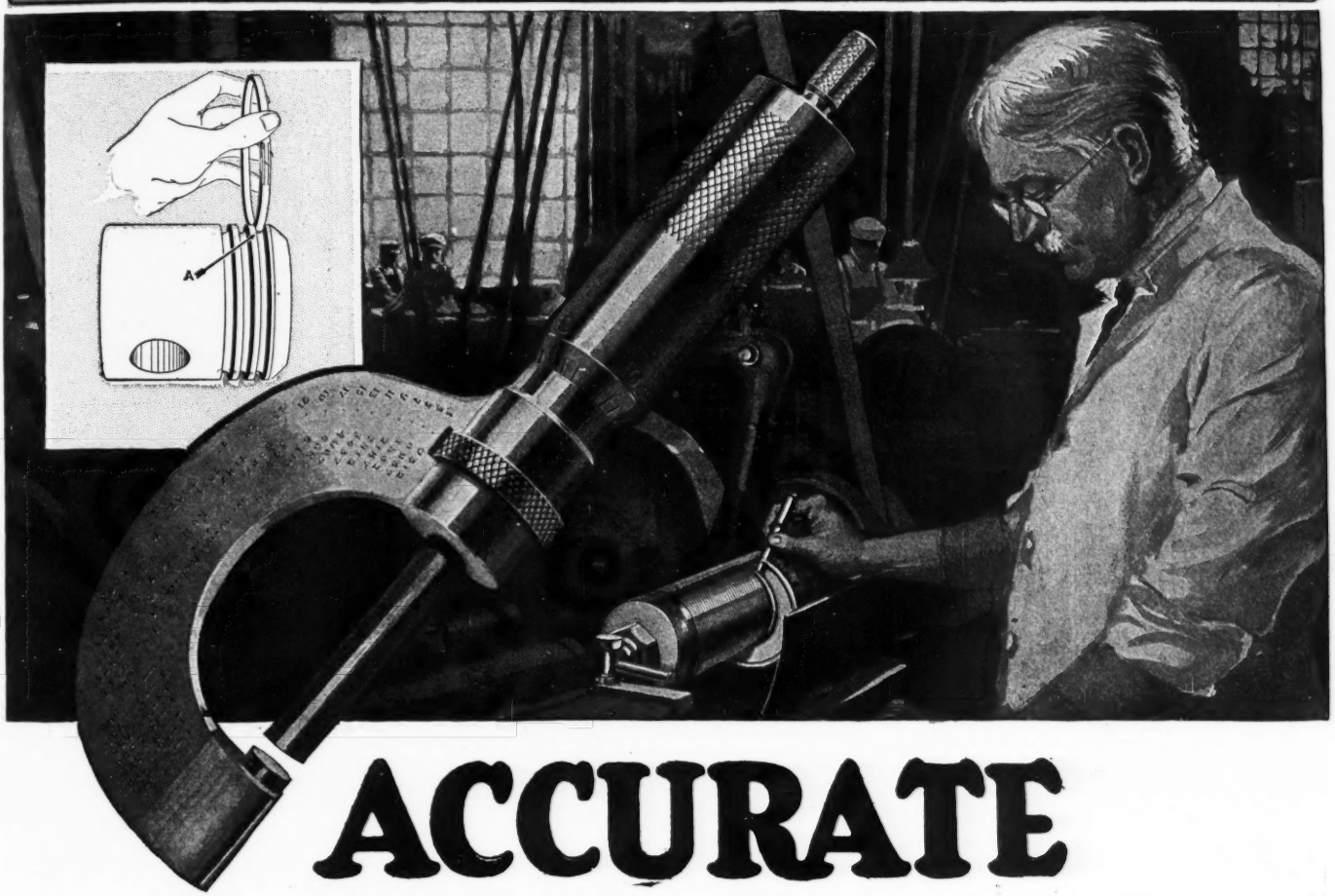
Send me full particulars concerning G. & F. FREEZE-NOT and your dealer proposition.

Name.....

Address.....

State..... City.....


The Guarded Opening
TRADE MARK REG.
BURD
High Compression
PISTON RINGS
PAT APR 7
The World's Standard of Piston Ring Efficiency



ACCURATE
to .00025 of an inch by Micrometer Test

Every mechanic knows—that if the opening in a piston ring can be closed positively so that it cannot leak—and at the same time provision is made for the necessary contraction and expansion—the ideal piston ring would be obtained.

The simple Burd Automatic Coupler does just that. It closes the gap effectively against leaks, and as the opening increases—automatically adjusts itself to cylinder wear—insuring gas and oil tight, high compression.

Burd Piston Rings are easy to install—fit accurately to .00025 of an inch—and require no filing or fitting. They are guaranteed against flaws and breakage.

Every Burd High Compression Ring is warranted to produce higher compression—develop more power, and use less gasoline and lubricating oil (when installed in cylinders that are not scored or warped), than any other piston ring made—and we will gladly refund the full purchase price—after thirty days' use—if they do not stand this rigid test.

Ask Your Jobber's Salesman—or Write Now

for a copy of 1920 Burd Piston Ring Directory of Sizes, price list and information about our Sales Helps for Garages and Repair Shops. Your jobber carries a complete stock of all sizes—and oversizes—to fill rush orders quickly.

BURD HIGH COMPRESSION RING CO., *Rockford, Illinois, U. S. A.*



Entrance to Offices of Atwater Kent Mfg. Company

ATWATER KENT

AUTOMOTIVE EQUIPMENT

Ignition, Starting and Lighting

THE Atwater Kent organization of master craftsmen are housed in a daylight plant providing every modern convenience for their comfort. The latest machinery of special design is arranged in orderly fashion to facilitate the greatest production under pleasant working conditions.

Atwater Kent equipment is manufactured to the highest standards of accuracy, precision and performance.

Seventeen years of unremitting designing, engineering and manufacturing effort have been directed to the attainment of an ideal—to produce the best equipment that skill and material make possible.

Atwater Kent Ignition Systems are used as standard equipment by a large number of America's foremost manufacturers of cars and motors.

ATWATER KENT MFG. COMPANY

Philadelphia

The NEW KOEHLER

Trucks and Road Tractors

Are Built to the Markets Needs

Some dealers are bucking the tide of truck sales by trying to make 1916 standards of construction meet 1920 standards of transportation. The effort is wasted.

The truck market has learned a ten-year lesson in three years, and means to profit by it. It demands a new kind of truck service, in which new economy, new power and new durability are assured by a new conscientiousness in manufacturing.

Those requirements, so necessary to the user—and so vital to the success of the dealer—are strikingly embodied in

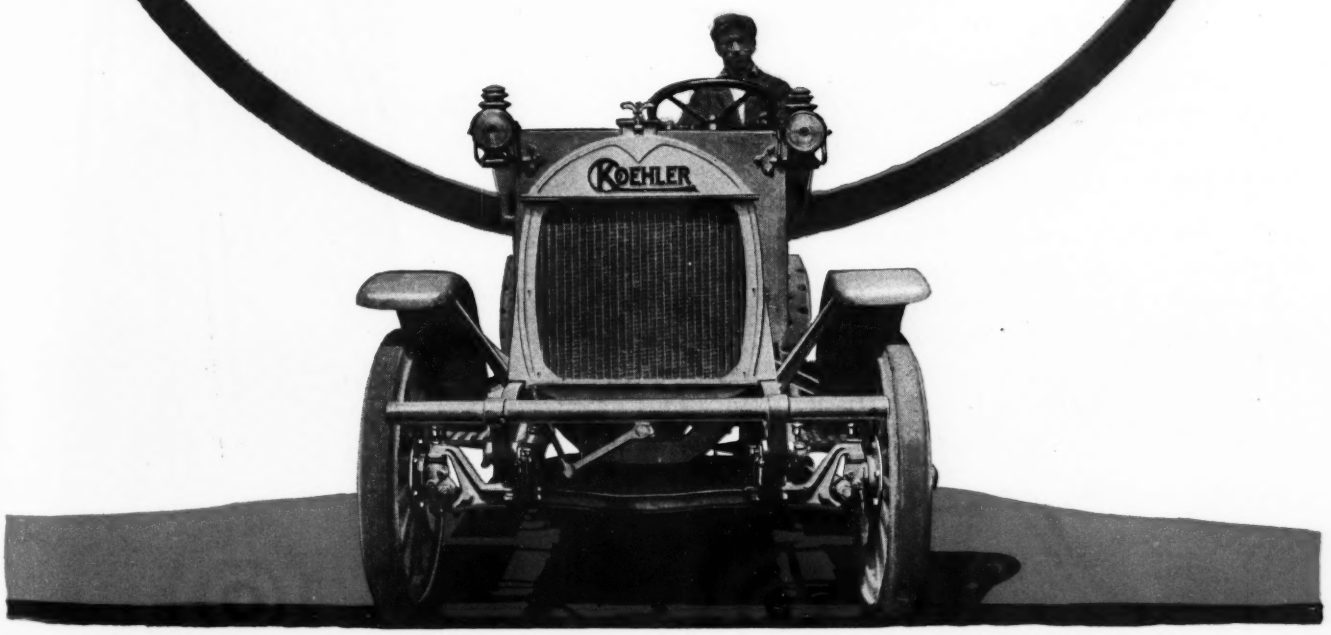
THE NEW KOEHLER LINE

The new Koehlers carry over nothing from the old line but the Koehler reputation for integrity. In all mechanical details they are absolutely new products—and their standards of serviceability and saleability are equally up to the minute. This applies to the complete Koehler line:

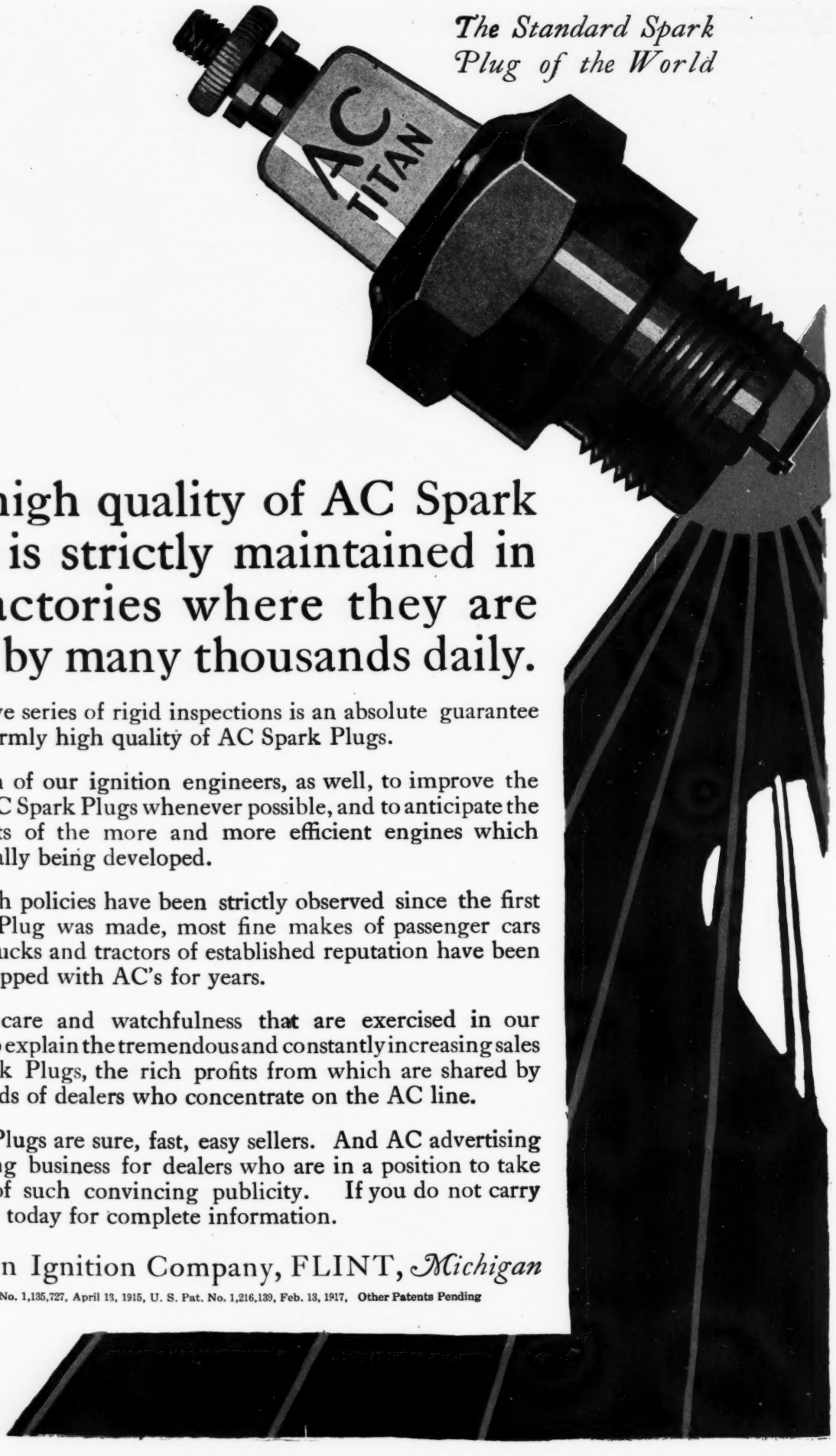
Model "C," 1¼-ton truck chassis	$1785
Model "M," 2½-ton truck chassis	2985
Model "CT," 3-ton road tractor chassis	1895
Model "MT," 5-ton road tractor chassis	3095

If you are ready to cash in on a new, high-quality truck line which is backed by an unusually attractive dealer proposition, write for the full Koehler details—TODAY

THE H. J. KOEHLER MOTORS CORP.
158 OGDEN STREET NEWARK, N. J.



The Standard Spark Plug of the World



The high quality of AC Spark Plugs is strictly maintained in the factories where they are made by many thousands daily.

A progressive series of rigid inspections is an absolute guarantee of the uniformly high quality of AC Spark Plugs.

It is the aim of our ignition engineers, as well, to improve the quality of AC Spark Plugs whenever possible, and to anticipate the requirements of the more and more efficient engines which are continually being developed.

Because such policies have been strictly observed since the first AC Spark Plug was made, most fine makes of passenger cars and most trucks and tractors of established reputation have been factory-equipped with AC's for years.

The great care and watchfulness that are exercised in our factories also explain the tremendous and constantly increasing sales of AC Spark Plugs, the rich profits from which are shared by the thousands of dealers who concentrate on the AC line.

AC Spark Plugs are sure, fast, easy sellers. And AC advertising is stimulating business for dealers who are in a position to take advantage of such convincing publicity. If you do not carry AC's, write today for complete information.

Champion Ignition Company, FLINT, *Michigan*

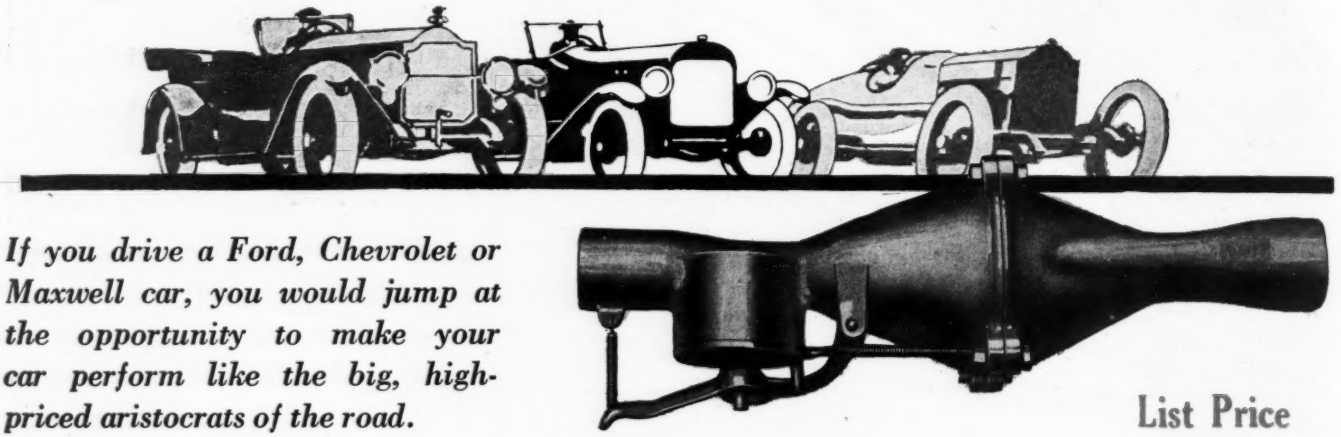
U. S. Pat. No. 1,135,727, April 13, 1915, U. S. Pat. No. 1,216,139, Feb. 13, 1917, Other Patents Pending



These manufacturers use AC's for factory equipment

Acason Trucks
Ace Trucks
Acme Trucks
Advance-Rumely Tractors
Ahrens Fox Fire Trucks
American-La France
Anderson
Apex Trucks
Apperson
Appleton Tractors
Atco Trucks
Auburn
Avery Tractors
Bates Steel Mule Tractors
Beck-Hawkeye Trucks
Bessemer Trucks
Betz Trucks
Braddon
Briggs & Stratton Motor Wheel (formerly Smith)
Brockway Trucks
Buffalo Motors
Buick
Bullock Creeping-Grip Tractors
Cadillac
J. I. Case T. M. Co.
Chalmers
Chandler
Chevrolet
Chicago Trucks
Clark Tractors
Cleveland
Cole
Comet
Commonwealth
Conestoga Trucks
Continental Motors
Crane Simplex
Daniels
Davis
Défiance Trucks
Delco-Light
Denby Trucks (Can.)
Diamond T Trucks
Diehl Trucks
Dodge Brothers
Dort
Duesenberg Motors
Eagle Tractors
Elmira
Essex
Fairmont Railway Motors
Federal Trucks
Frontmobile
F-W-D Trucks
Genco Light
Glide
G. B. S. Motors
G.M.C. Trucks
Gramm-Bernstein Trucks
Gray Dort
Hackett
Hahn Trucks
Hall Trucks
Harvey Trucks
Hatfield
Haynes
Herschell-Spillman
Hispano-Suiza
Holt Tractors
Howell Tractors
Hudson
Hupmobile
Hurlburt Trucks
Independent Trucks
Jordan
Jumbo Trucks
Kalamazoo Trucks
Kearns Trucks
Kent Concrete Mixers
Keystone Trucks
Kissel Kar
Kleiber Trucks
Klemm Trucks
Knox Tractors
Koehler Trucks
K-Z Trucks
La Crosse Tractors
Lalley-Light
Liberty
Locomobile
Maccar Trucks
Malbohm
Marmon
Master Trucks
Maxim Fire Trucks
Maytag
McLaughlin (Canada)
Menominee Trucks
Meteor
Midland Trucks
Midwest Engines
Minneapolis Motors
Mitchell
Moline-Knight
Moreland Trucks
Napoleon Trucks
Nash
National
Nelson
Nelson Tractors
Nelson & Le Moon Trucks
Netco Trucks
Noble Trucks
Oakland
Old Reliable Trucks
Oldsmobile
Oneida Trucks
Owens Light & Power Plants
Packard
Paige
Pan
Pan-American
Parker Trucks
Paterson
Patriot Trucks
Peerless
Perfect Power Sprayers
Phianna
Pierce-Arrow
Pilot
Pioneer Tractors
Premier
Ranger Trucks
Red Wing Thorobred Motors
Reo
Re Vere
Riker Trucks
Roberts Motors
Robinson Fire Trucks
Rock Falls
Rowe Trucks
Ruten ber Motors
Samson Tractors
Sandow Trucks
Sanford Trucks
Saxon
Scripps-Booth
Scripps Motors
Seagrave Fire Trucks
Seneca
Signal Trucks
Singer
Speedway Motors
Standard "8"
Standard Trucks
Stearns-Knight
Stearns Tractors
Sterling Engines
Sterling Trucks
Stewart Trucks
Straubel Engines
Sullivan Trucks
Super Trucks
Swartz Lighting Plants
S-S-E-Co.
Tiffen Trucks
Titan Trucks
Tower Trucks
Trego Motors
Union Marine Engines
Universal Trucks
United Trucks
Van Blerck Motors
Veerac Motors
Vim Trucks
Wallace Tractors
Ward La France Trucks
Westcott
White
Whitney Tractors
Wichita Trucks
Wisconsin Motors
Wolverine Tractors

Purrs Like a Packard — ROARS LIKE A RACER



If you drive a Ford, Chevrolet or Maxwell car, you would jump at the opportunity to make your car perform like the big, high-priced aristocrats of the road.

Here Is the Chance

The Taber Combined Muffler and Cut-Out solves the Muffler problem for all time. It reduces back pressure to a minimum and gives a surprising rush of new power to your engine. Better still, the gas and oil consumption will show a gratifying reduction.

More than a score of exclusive patented features distinguish the Taber from any other device on the market. By giving free passage to the explosive gases with least possible resistance, the Taber affords full protection against the evil effects of back pressure. It clears both the engine and muffler of carbon, and oil muck. The Taber cannot clog up nor blow out. With a Taber, the motor is kept sweet and clean. It affords extra power for hills and yields full mileage for gasoline. With the Muffler your car purrs like a Packard; with the Cut-Out open it roars like a racer.

Can't Loosen or Rattle

The Taber is self-cleaning, mud and carbon-proof. It never becomes loose or rattles. It requires no attention, adjustment or upkeep. It lasts for the life of the car, always ready, responsive and dependable. It is built mechanically right and each outfit is thoroughly tested before it leaves the factory.

Attach It Yourself

So easily is the Taber attached that you will want to do it yourself. Complete instructions accompany each Taber. No special tools are needed.

DEALERS:

Snap up this proposition at once. Wire your order today. Learn how easy it is to sell the Taber. We give you live-wire sales co-operation. Please include the name of the jobber with whom you prefer to deal.

JOBBERS:

If any of you have been overlooked by our Salesmen, don't feel offended. Our District Sales Managers are trying to see you all. If you are a legitimate jobber of automotive equipment, write or wire us at once. Quick action will pay quick dividends.

List Price

Ford Type

$4.85

Chevrolet and Maxwell Type

$5.50

Regular models for FORDS, CHEVROLETS and MAXWELLS, BUICK and DODGE models to be announced soon.



"Depend upon it, your car needs a Taber! Of course, you can't realize what a difference in car performance the Taber makes until you have tried it. Go prove it NOW."

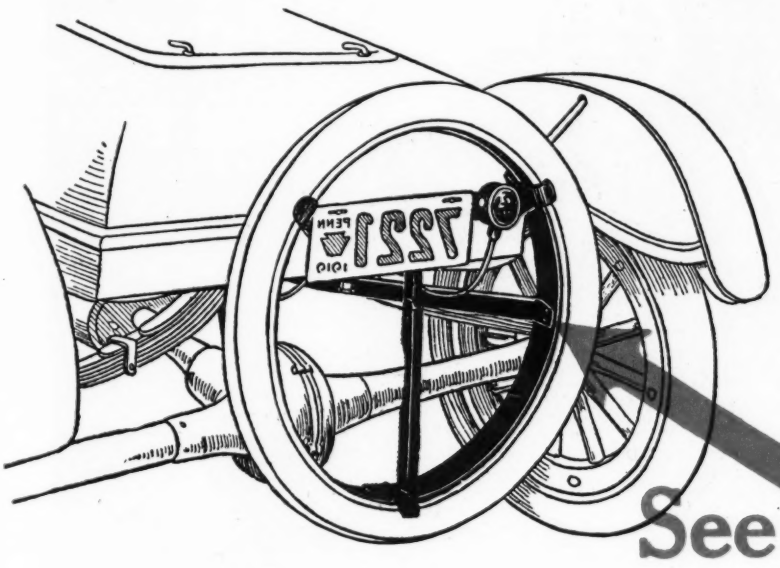
EMCO MANUFACTURING COMPANY, Inc.

Makers of Dependable Products for the Automobile

42 Court Street, Binghamton, N. Y.

THE TABER BOTH A MUFFLER & CUTOUT

THE EMCO TIRE CARRIER



See that Joint?

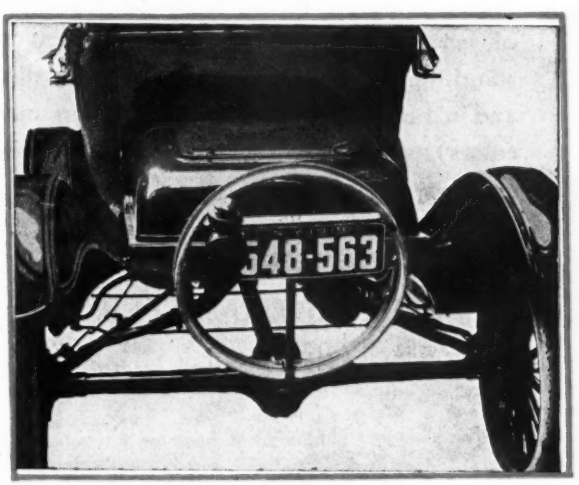
It makes the Emco Tire Carrier the simplest and most easily operated carrier obtainable.

A slight pull with the hand and the tires are free—close the joint and tires are locked securly on. A child can operate.

Requires no wrench or tool to take off or put on tires.

Can be installed by any user. Cannot get out of order.

The Emco Tire Carrier is made for Ford and Chevrolet cars for one or two demountable rims, or for one or two tires without the rims.



It is made of wear-proof material, neatly finished and will not rack nor rattle from vibration or road shocks.

This carrier is meeting with wonderful success in every territory where it is being offered for sale.

If you are a dealer and handle Ford or Chevrolet parts it will bring you new business and quick profits. Write us at once and we will be glad to give you advance information which we are certain will add you to our big Dealer List.

EMCO TIRE CARRIER

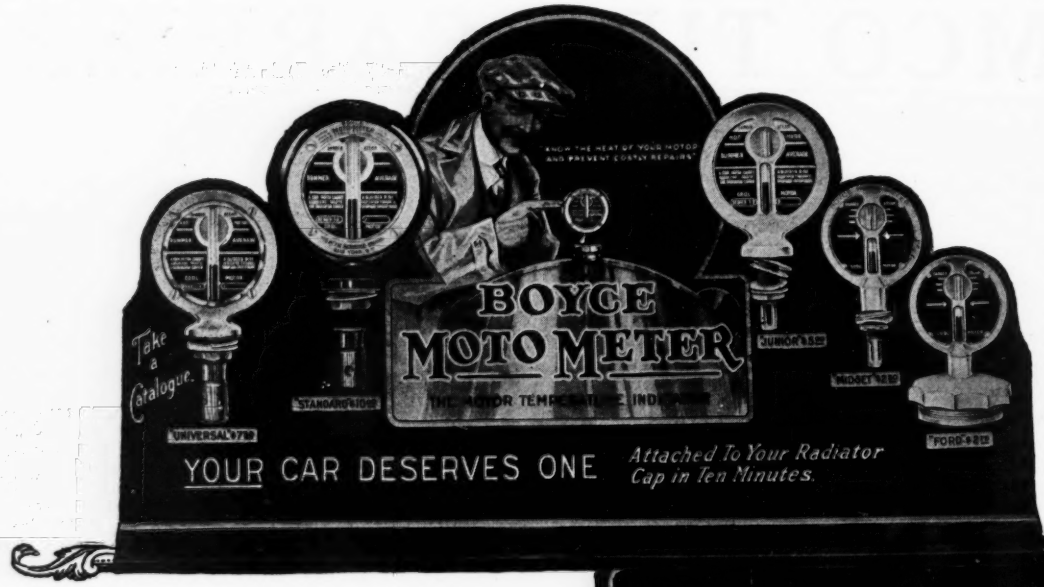
TRADE MARK REGISTERED EMCO

EMCO MANUFACTURING CO., Inc.

Makers of the Taber Combined Muffler and Cut-out

600 Court Street **Binghamton, N. Y.**

TRADE MARK REGISTERED EMCO



Mahogany Display Stand (19"x 11¾") For your counter



Mahogany "Free Dial" Board (20½" x 14") For your wall

Boosting Sales

THIS interest-clinching display stand has been proving a consistent sales producer for Moto-Meter dealers. It has a strong appeal to the sense of security and personal pride of the motorist. This stand, together with a free-dial-offer display board, and a big, handsome free-installation metal sign (in colors), supplied without cost to all dealers who purchase in one order ten or more assorted Boyce Moto-Meters. Ask your jobber.

THE MOTO-METER CO., Inc.

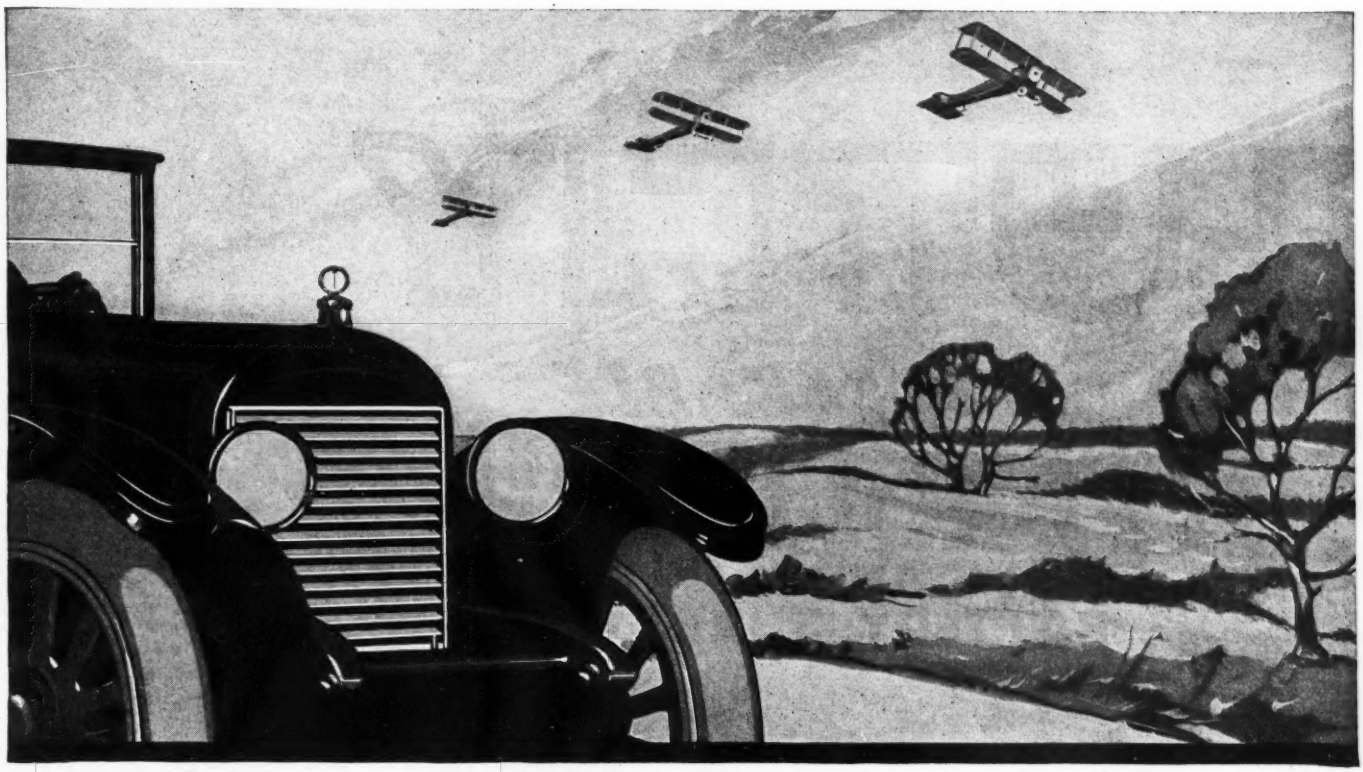
Long Island City New York



Attractive four color Service Sign (26¾" x 19") For your window



BOYCE MOTOMETER



Make Your Car 100% Efficient

EQUIP your car with the UNIVERSAL Radiator Shutter and put it on the same efficient operating basis as the aeroplane. The shutter is absolutely a year round necessity. Its necessity is a proved fact. Several leading makes of cars now come factory equipped with shutters. All aeroplanes in the recent transcontinental flight were shutter equipped, which helped to make possible the performing of this stupendous feat.

Trying to heat a cool motor with cold air rushing thru the radiator cooling it off as fast as the fuel heats it, is with the ushering in of the new era of automotive efficiency, a thing of the past.

The UNIVERSAL is Made for the Following Cars:

Ford	1917 and later
Overland "4"	1920
Overland "90"	all models
Maxwell	1917-18-19
Maxwell	1920
Chevrolet	1917-18-19-20
Dodge	1915 and 16
Dodge	1917-18-19-20
Buick	all 1917 "D" models
Buick	all models "E" 1918, "H" 1919, "K" 1920
Oakland	1918-19-20
Saxon "6"	1917-18-19-20
Reo "R" and "S"	
Studebaker Series "19"	Little Six
Studebaker Series "19"	Big Six
Chalmers	35C, 1917-18-19-20
Chandler	1917-18-19-20
Hupmobile	1917-18-19-20
Nash	1917-18-19-20

Other types being developed

UNIVERSAL RADIATOR SHUTTER

Conserves your engine heat. It operates from your driving seat just as easily as turning on your lights or ignition. The UNIVERSAL Radiator Shutter positively enables you to regulate the flow of air so that just enough of it strikes the motor to keep it operating at the correct temperature of 185 degrees—not too hot—not too cool—but just at the point where all the fuel vaporizes and makes power in the cylinders instead of kerosene in the lubricating oil and carbon in the motor.

Get the UNIVERSAL today. You need it to enable you to drive with greater economy and satisfaction. Your dealer has the UNIVERSAL or can get one for you. *Descriptive circular sent upon request.*



Auto Metal Parts Company

DEPT. OF SALES—624 MICHIGAN AVE., CHICAGO, ILL.

FACTORY—DES MOINES, IA.



LUTHY

NON-BREAKABLE HYDROMETER AND BATTERY FILLER



Price $1.25

LUTHY BATTERY FILLER



So simple a child can use it. Only filler on market which automatically fills battery to correct height. Eliminates guesswork. Fills all cells to correct height, increasing battery life by keeping all cells under equal strain. Adds solution to battery only when needed.
Price, $2.00.

NON-BREAKABLE

The Cheapest and Best Instrument on the Market for Testing Storage Batteries

In the ordinary hydrometer, a GLASS float is enclosed within a GLASS syringe—both fragile and easily broken. In the LUTHY Hydrometer these parts are enclosed in the finest grade celluloid—tough and resilient, yet clear as glass. LUTHY celluloid construction produces not only a non-breakable instrument, but also a hydrometer which cannot be surpassed for accuracy.

LUTHY Hydrometers are impervious to acid. Great time savers in the garage, shop or service station where a large number of cells are tested. Quick work is possible with all danger of breakage removed. Where repeated shakings are necessary to bring the face of the hydrometer float around to reading position, there is no fear of its being shattered, and no need for careful handling as with glass instruments.

Only Hydrometer made that can be thrown into the tool-box along with pliers and hammers—with the assurance that you will have a whole hydrometer the next time you have use for one. Sell or use a LUTHY Hydrometer and let the other fellow get the breaks.

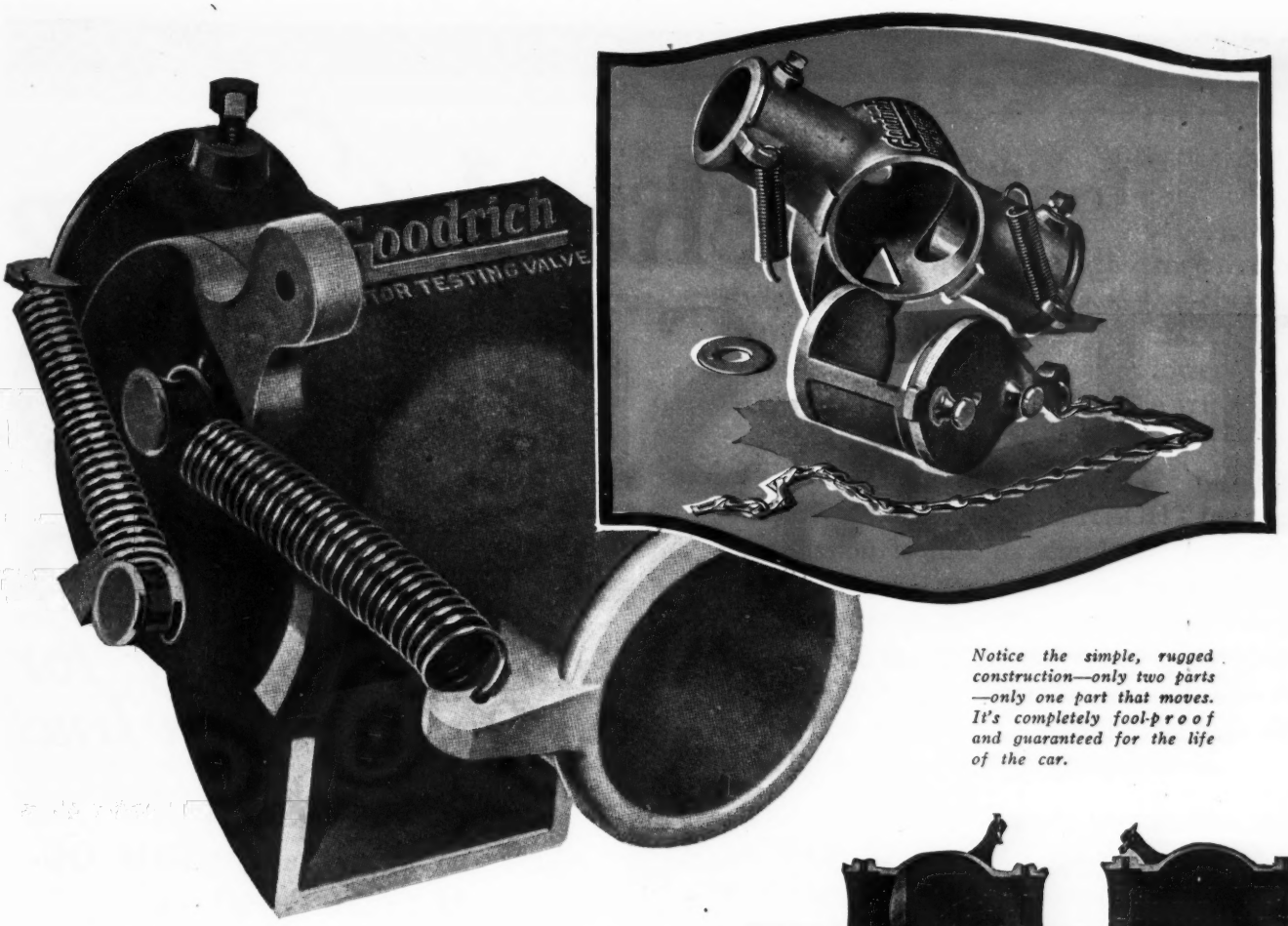
Write for sample offer and complete descriptive literature.

Liberty Battery Filler, $2.00

Dealers—Stock From Your Jobber
Jobbers—List This. It Pays Big

Manufactured by

Luthy Hydrometer Co.
97 Woodward Ave.,
Detroit, Michigan



Notice the simple, rugged construction—only two parts —only one part that moves. It's completely fool-proof and guaranteed for the life of the car.



Showing motor-testing valve open. Bell shaped mouth produces far louder noise than ordinary cutout and relieves the motor of all back pressure.



Showing motor-testing valve closed. Revolving shutter with knife edge absolutely prevents the formation of carbon.

How Do You Know Every Cylinder Is Working?

WHETHER you own a four, six, eight or twelve cylinder car you cannot be sure at all times that every cylinder is hitting. And you know that a missing engine is a glutton for gas. Your motor should be tested daily.

Your engine can have no secrets from you when it is equipped with a Goodrich Motor Testing Valve. It is a cut-out built for an indispensable purpose. It distinctly reproduces every pulsation of the engine and instantly reveals any irregularity.

The bell mouth opening of the Goodrich Motor Testing Valve greatly intensifies the sound of each explosion, allows ample space for the expansion of gases and relieves the motor of all back pressure.

It is so simply constructed, so strong, so easily installed, so impervious to hard knocks and adverse conditions—that it is indispensable on all cars whose drivers want to know at all times how their engines are performing.

Guaranteed to last the life of the car without sticking, slowing up, carbonizing or giving trouble of any kind.

DEALERS:—Order from your regular jobber or direct. Discounts on request.

A size for every Car or Truck

FORD SIZE—LIST PRICE

$1.75

Including Pedal, Pulley and Cable. Larger sizes at corresponding prices.

GOODRICH-LENHART MFG. CO.

22 Pine St., Hamburg, Pa.

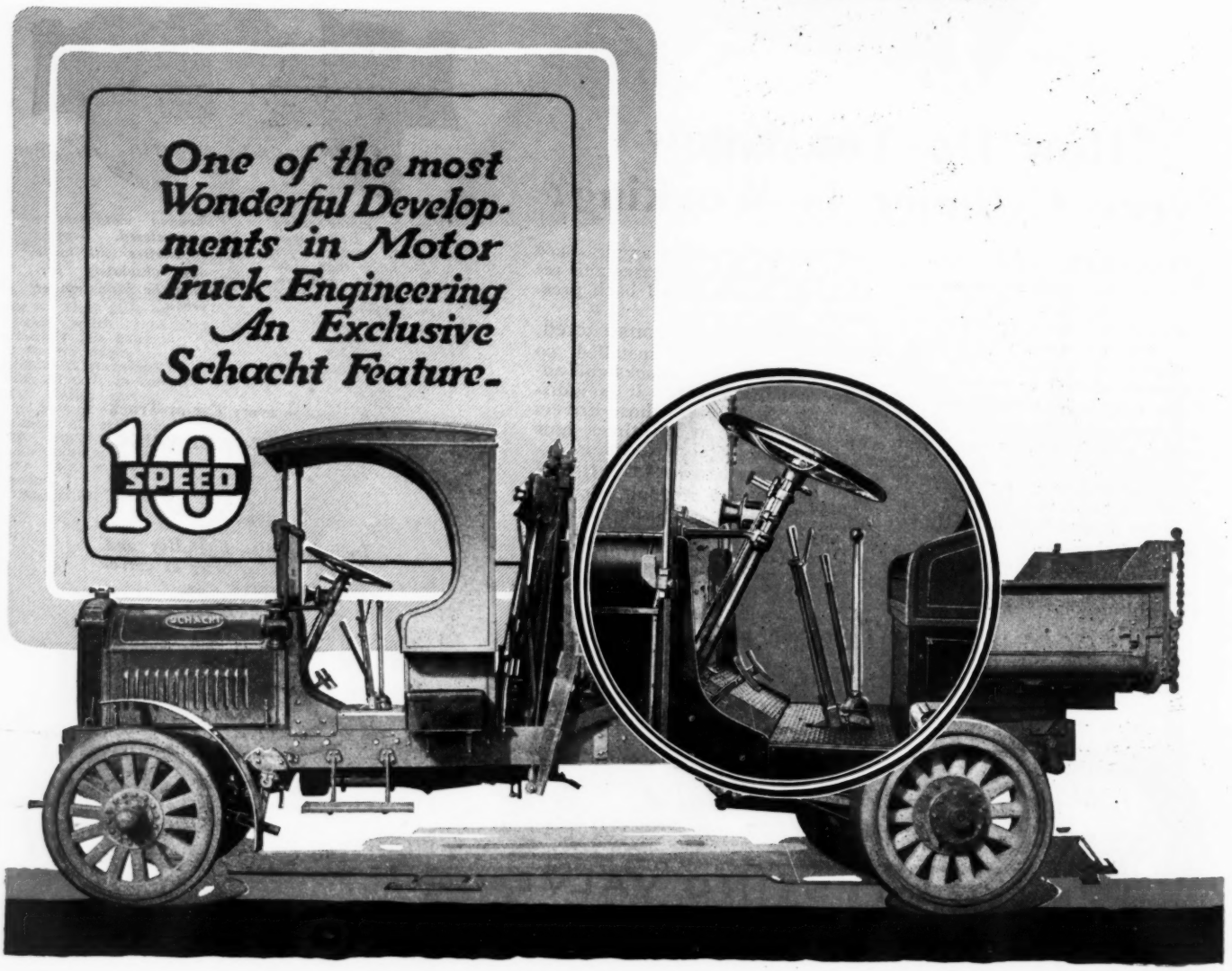
Goodrich

MOTOR TESTING VALVE

Schacht New TEN SPEED Transmission

Designed Especially for Heavy Duty Five Ton Truck

PATENT APPLIED FOR



Sets New Efficiency Standard

THE AVERAGE five-ton truck is geared for power—not for speed. To attempt to operate the truck at a speed of fourteen or fifteen miles per hour, which the operator will invariably do when running empty or on good level roads, necessitates a tremendous engine speed. The result is a quick deterioration of the engine as well as the chassis in general, due to the tremendous vibration, to say nothing of the increased fuel consumption and the high cost of operation. The purpose of the SCHACHT ten speed transmission is to eliminate this evil and at the same time provide a wide range of power reduction to enable the truck to negotiate any kind of a road or grade where traction can be secured.

20 Miles per Hour on High at 1000 R. P. M.

With the SCHACHT ten speed transmission a vehicle speed of twenty miles per hour on high gear can be obtained with a five-ton truck at an engine speed of one thousand R. P. M. It is immediately apparent that the efficiency of the truck as a whole is increased almost 100% since it can cover about twice as much ground in a given time as the average five-ton truck. In addition, the life of the engine is practically doubled and the cost of operation is materially reduced making the lowest possible cost per ton mile for a five-ton truck.

Easy to Operate

The construction of the SCHACHT ten speed transmission is just as simple as any other transmission and contains fewer parts than the average four speed. There is nothing complicated about the SCHACHT ten speed transmission either in construction or operation and any novice can learn to operate the gear shift as easily as on any other transmission.

There are two gear shift levers—the main gear shift lever and the auxiliary lever, the latter having only two movements, forward and backward. The main gear shift lever controls four forward speeds and one reverse. The use of the auxiliary lever simply doubles the reduction of each speed, making a total of eight forward speeds and two reverse, supplying the power needed for every requirement and enabling the operator to select just the right speed for any occasion.

The SCHACHT ten speed transmission is an exclusive SCHACHT feature and is not contained on any other truck. The SCHACHT five-ton truck with ten speed transmission has no equal in either pulling power or high vehicle speed and fills a long felt need in the heavy hauling field.

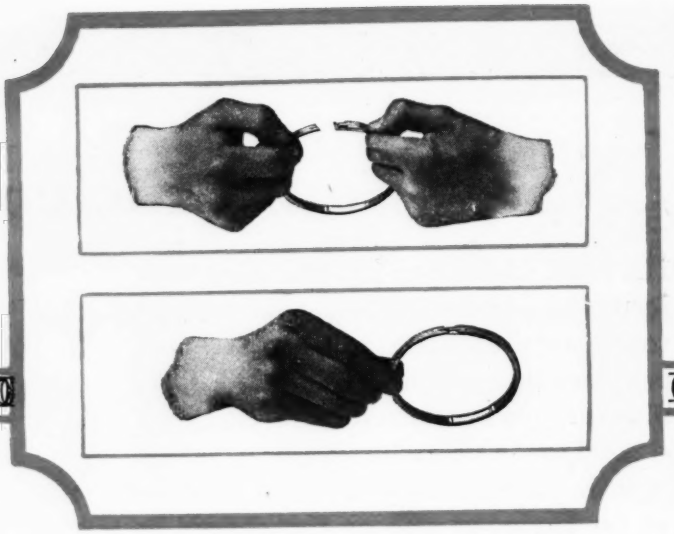
A Big Dealer Opportunity

The SCHACHT worm drive trucks are one of America's oldest and most substantial truck lines. With the new improvements on the five-ton model, the SCHACHT is also the most distinctive selling proposition ever offered. A limited amount of territory is still open and we invite inquiries from those progressive dealers who are quick to take advantage of all big developments in the motor truck industry.

The G. A. Schacht Motor Truck Co.

Cincinnati





Why Seal-Tite Piston Rings Always Sit Tight

PULL a Seal-Tite Piston Ring apart at the split. Let loose, and note how quickly it springs back into place. Every Seal-Tite Piston Ring has that same life and spring—and **retains it**—because each ring is **individually cast** from a special grade of refined grey iron. This permits leaving the scale on the inside of the ring. In no other way can such lasting springiness be obtained in a piston ring.

Metallic Seal Prevents Leaking

Insures a perfect-working motor, more power, greater speed, longer life to the motor, a saving of oil, gasoline and overhauling charges. **Positive-working**—self-adjusting—maintaining an absolute seal between firing chamber and crank case all the time. Prevents loss of compression and suction of oil into firing chamber.

The "Seal-Tite" is simply an **improved** standard one-piece split piston ring—(the type that engineers have always recognized as the safest and most efficient—except for the one fault that it leaked at the split). This fault has been overcome in the "Seal-Tite," making it the 100% efficient ring.

GUARANTEED to Make Good

We agree to refund the full purchase price upon return of rings within 60 days if they fail to give entire satisfaction, providing the motor is fully equipped with **Seal-Tite Piston Rings**, and that cylinders are not scored before Seal-Tite Rings are installed. We also guarantee the Seal-Tite against defects in material and workmanship.

Write for interesting **booklet.**

Dealers: It will pay you to investigate the **Seal-Tite Piston Ring.** Its efficiency is so apparent that it sells itself. Write for our liberal proposition.

Seal-Tite Piston Ring Co., Minneapolis

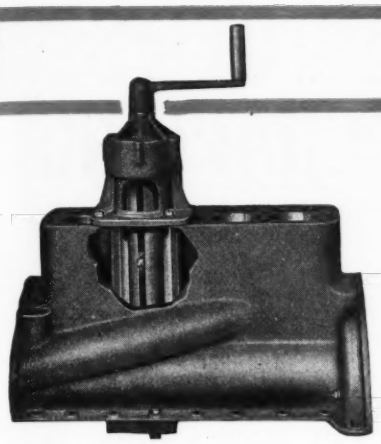
SALES OFFICES

CHICAGO, ILL.....1410 S. Michigan Ave.
CINCINNATI, OHIO.....720 Main St.
PITTSBURGH, PA.....1125 Park Building
NEW YORK, N. Y. No. 2 Columbus Circle
MILWAUKEE, WIS. 129 W. Water St.
SEATTLE, WASH. 313 E. Pine St.
OMAHA, NEBRASKA. 5134 South 24th St.
BALTIMORE, MD.....2011 No. Charles St.
ST. PAUL, MINN.....224 W. Sixth St.
DETROIT, MICHIGAN ..408 Grand River Ave.
CLEVELAND, OHIO..... ....2011 E. 46th St.
PHILADELPHIA, PA... 719 N. Broad St.
BOSTON, MASS. 839 Beacon St.
WICHITA, KANS. 244 S. Wichita St.
SIOUX CITY, IOWA. 413 Douglas St.
MONTREAL, CANADA. 109 St. Paul St., West
WINNIPEG, CANADA 24 Sylvester-Willson Bldg.



ONE PIECE OIL—PROOF

It's Easy With a "Michigan"



Rebore Cylinders Like New



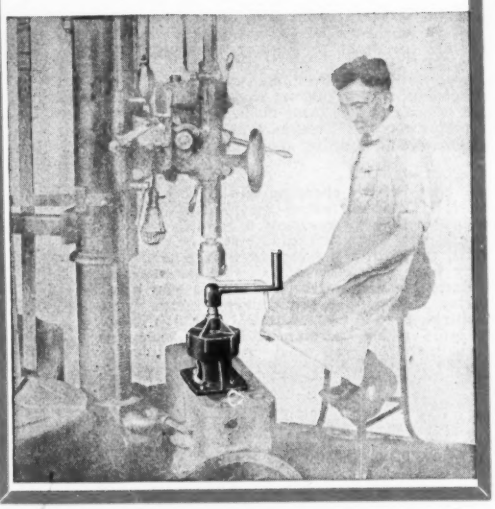
Easier and Quicker On a Michigan—

There's A Reason

THE ONLY REBORING TOOL THAT ALSO BURNISHES

HAND OPERATION

CAN BE OPERATED BY POWER



The "Michigan" is the only reboring tool that also burnishes—that supports the cutter at top and bottom—that locates the cutter centrally in the cylinders and keeps it there—that hardens and smooths the cylinder walls—that can be used effectively.

In the Shop or in the Field

A Michigan rebores cylinders so that they are, in finish and working qualities, just like new. The burnishing smooths and hardens the walls—the cutter support and method of keeping cutter central the **entire length of the bore insure accuracy.**

In the shop or in the field the Michigan is a proved-in-service time-saver. Operated by hand, it averages twenty-three minutes to a cylinder. Put on a drill press and turned by power, this time is cut to fifteen minutes. Illustrations show a "Michigan" operated by hand and by power. Hand operation is as easy as it is quick—no broken backs from stooping over.

Cutter has one single point, is of high speed steel, simple and easy to adjust and keep adjusted. With the locating blocks provided, tool

Can Be Located in Less Than Five Seconds

The "Michigan" is easy to operate, fast in service and retains these features throughout its long life.

Needed in every repair shop and service station.

Excellent Jobbers' Proposition—Write for it today.

For Fordson Tractor Cylinders
Ford Model T Cylinders

PRICES AND TERMS

OUTFIT "A"—For reboring and burnishing Fordson tractor cylinders only, **$150.**

OUTFIT "B"—For reboring and burnishing model T cylinders only, **$150.**

OUTFIT "C"—For reboring and burnishing both Fordson tractor and model T cylinders, $225.

F. O. B. DETROIT

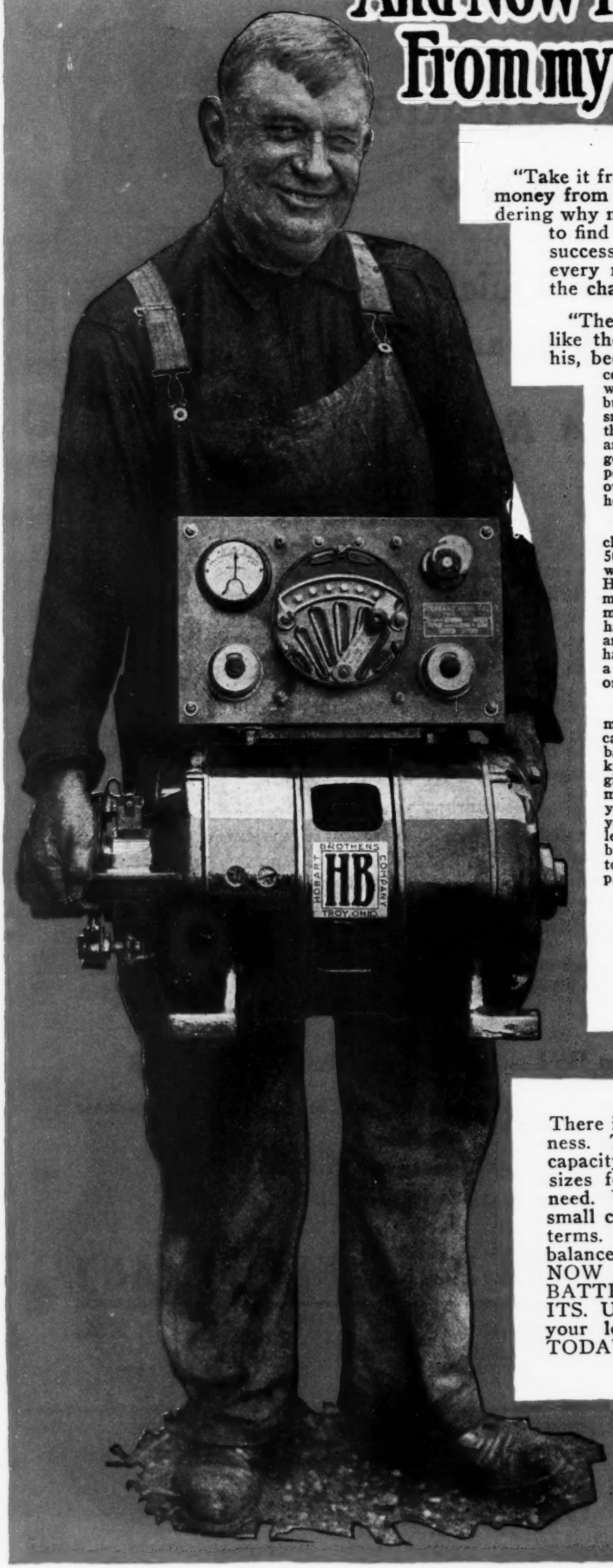
Prompt Delivery

MICHIGAN MACHINE COMPANY

Detroit, Mich. **U. S. A.**

MICHIGAN REBORING AND BURNISHING TOOLS

"And Now for REAL PROFITS From my BATTERY CHARGING"



"Take it from me, battery charging is going to pay me some **real money from now on.** Here I dubbed along for a whole year wondering why my battery charging business was so rotten and trying to find out why Blank's Garage was making such profits and success on their Battery Business, while I was losing money every month. Then one day I found out! The secret is in the charging outfit that Blank uses.

"They've always had one of these HB Battery Chargers, like the new one of mine. I laughed at Blank when he got his, because I thought I'd be a fox and get a charger that cost me less money and be that much ahead of him on profits. It was fine for the first month, but then my troubles commenced. I had bulbs burn out that cost me about $8.00 each to replace, then some small, expensive part would break or get out of order, and run up the repair bill some more. I don't know anything about electricity and my machine would stand idle for four or five days, till I could get a man to fix it. Meanwhile, my customers would get sore at my poor service and first thing I knew, they were taking their batteries over to Blank's place, and soon he was getting all their trade because he gave really reliable charging service.

"From now on, everything will be all right. YOU'LL find the old charger back on the scrap pile in the rear of the shop, and this HB 500 watt Charger is going to start as soon as I can connect the wires to my power lines. I've learned a lot by my experience. The HB Company showed me that hundreds of garages no bigger than mine are making $100 to $250 CLEAR EXTRA PROFIT every month from battery charging with HB Equipment. HB Chargers have no delicate parts to wear out or break, no expensive renewals, and anyone can install and operate one of these machines. You don't have to be an electrician because an HB Charger runs itself 24 hours a day and the only attention needed is oiling about once every three or four months.

"I expect from now on, that battery charging will be my biggest money maker. Why, the HB Company asked me to pay only $15 cash on the 500 watt machine and I have almost a year to pay the balance on easy monthly terms. That is the fairest proposition I know, and yet on top of it, they allow me ten days' free trial and give me an absolute money back guarantee of satisfaction. Believe me I'm strong for HB Battery Chargers, and I say to you now, you men who aren't making a good big profit every month from your battery charging business, that if you want BIG PROFITS at least cost, and want to build a big, permanent battery charging business, an HB Charger is just what you need. And my advice is to order one NOW because fall and winter will bring your biggest profits."

HOBART BROTHERS COMPANY
Box A111, Troy, Ohio
Successful Manufacturers Since 1893.

There is an HB Battery Charger to fit any size Battery business. The one illustrated is the HB 500 watt outfit, with capacity of 1 to 8 6-volt batteries at one time. Other sizes for 16 or 32 batteries. Choose the size you need. You can get any HB charger for only a small cash payment, and the balance on easy terms. Your profits should easily pay the balance and leave a good surplus besides. NOW is the time to start for BIG BATTERY CHARGING PROFITS. Use the coupon. Pin it to your letter head and mail TODAY.

TEAR OFF HERE

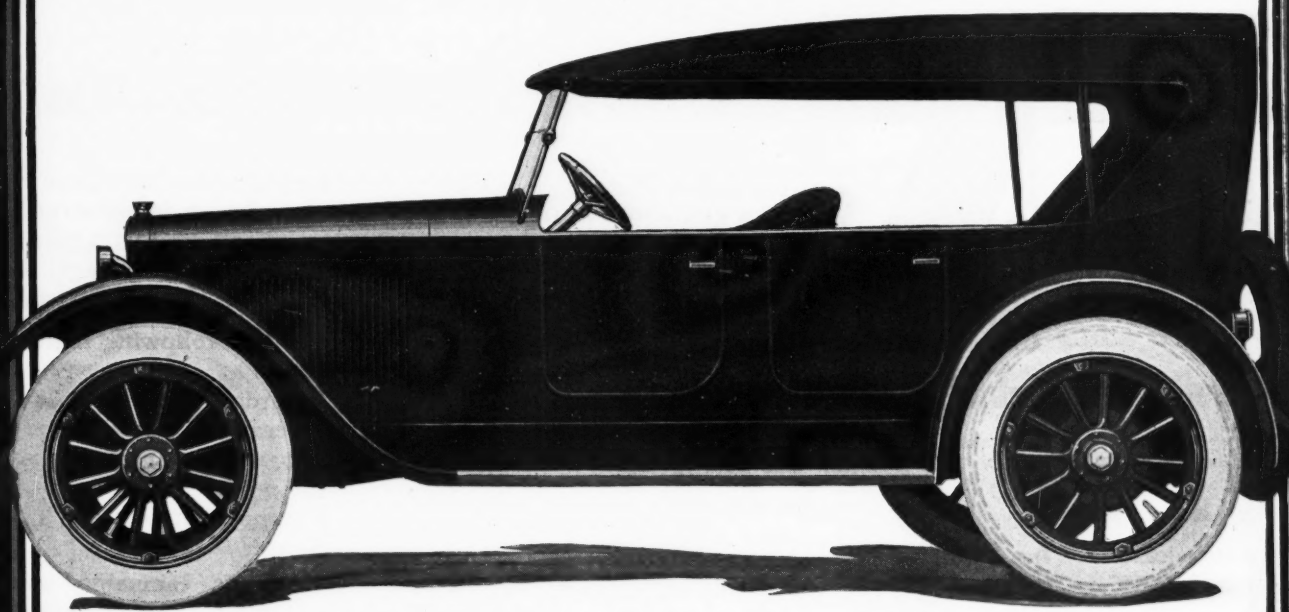
HOBART BROS. CO. Box A111, Troy, Ohio

Send me information about the HB Equipment checked below, and tell me about the HB Money-Back Guarantee and Trial plan:

☐ HB 8-Battery Charger.
☐ HB 16-Battery Charger.
☐ HB 32-Battery Charger.
☐ HB Ball Bearing Electric Motors.
☐ HB Belted Charger (used where electric current is not available).

Your Name.....
Address.....
State.....

COMING!



$1125.00

THE LAST WORD IN MOTORDOM

GARDNER
ST. LOUIS

"IT SPEAKS FOR ITSELF"

THE GARDNER MOTOR CO.
ST. LOUIS, U.S.A.

ZELNICKER Ever-Tyte

The Piston Ring for All Engines

More Power On Less Fuel—

Guaranteed



No other Piston Ring carries such a guarantee. Printed below is an agreement — its terms are wide and complete. Owners of automobiles, farm machinery and other makes of engines know its significance. Read it NOW—every word!

With ZELNICKER *Ever-Tyte* Piston Rings you get maximum power from minimum fuel and oil. Its six point circular expansion makes absolute all-'round contact with the cylinder wall. By means of Zelnicker's Patented Right Angle Interlock, three piston rings are combined into one.

Its operation is unfailing because its principle is true.

Result: You get decreased friction and more power.

Every fraction of power from every explosion is conserved.

Get this: Over 17,579,284 readers will see the message about ZELNICKER *Ever-Tyte* Piston Rings in the following high-class publications:

Saturday Evening Post
Literary Digest
Progressive Farmer
Successful Farming
Country Gentleman
Sunset Magazine

When this campaign sweeps the country will you be ready to respond? Order now — a call may come tomorrow. "Prepare."

Satisfied customers and bigger profits for you. Write for our proposition.

THE EVER TIGHT PISTON RING COMPANY
SAINT LOUIS, MO.



We guarantee ZELNICKER *Ever Tyte Piston Rings to produce higher compression, develop more power, and use less fuel and lubricating oil, you to be the sole judge.*

We will refund the full purchase price to any purchaser upon the return of the rings, if they fail to give absolute satisfaction within a period of twelve months from date of installation.

THE EVER TIGHT PISTON RING CO. ST. LOUIS

No 2,628,242

W. Zelnicker PRES.

Read
***The* Guaranty Bond**



Demonstrating how the spiral cut puts tension into the Inland Piston Ring.

Why the Spiral Cut Makes Inlands Tight-fitting.

Built on the principle of the spiral cut—with all the powerful tension of a strong, steel spring—Inland Piston Rings are both gas-tight and oil-tight.

Because of the spiral cut, Inland Piston Rings have the necessary "spring" to insure a constantly tight fit against the cylinder walls. And yet they provide just enough clearance for the perfect play of the pistons—without allowing gasoline to leak down into the crankcase or oil to creep up and interfere with combustion.

Nor can oil or gas escape at the ends of the ring—for the split portions fit over each other tightly, sealing every possible gap. The result is—more perfect and economical operation of your engine. Oil and gas are kept separated, so that each can perform its proper function. Every drop of fuel is converted into power, and every drop of oil is utilized as lubricant.

Inland Piston Ring sales are on a basis of millions per year.

Live dealers, everywhere, are finding it profitable to push the sale of Inland Rings.

INLAND MACHINE WORKS

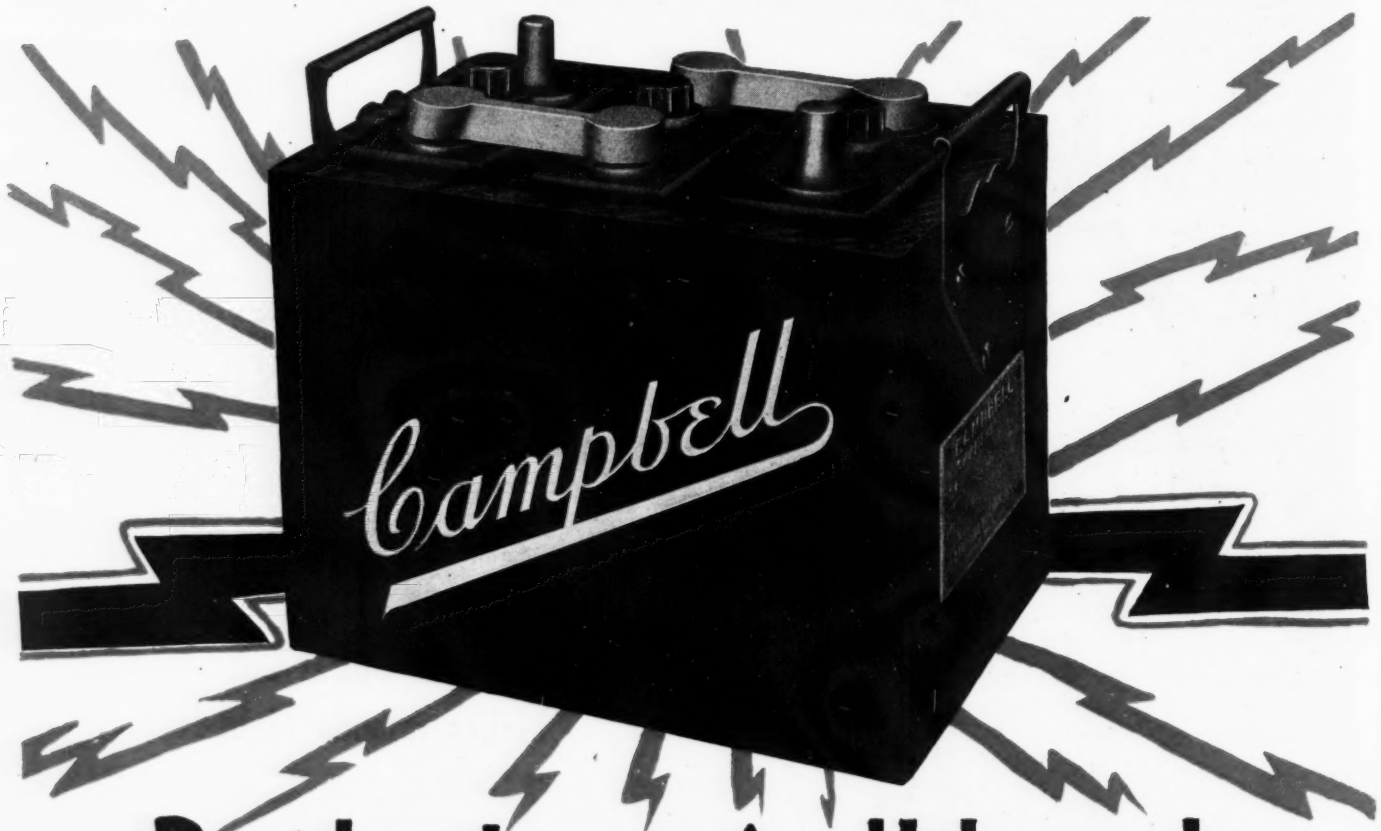
1646 Locust Street **St. Louis, Mo.**

INLAND

ONE-PIECE PISTON RING

Inlands are for every type of internal combustion motors—automobiles, trucks, tractors, stationary engines and marine engines.

MAKE YOUR MOTOR HUMP — USE A CAMPBELL BATTERY

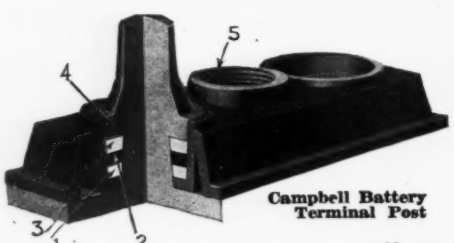


Post Leakages Are Unknown In CAMPBELL STORAGE BATTERIES

A Big Selling Point

Here is a battery built out of the experience of all batteries. All of the troubles and failures, the break downs and annoyances have gone thru the evolutionary process of exacting research, scientific experimentation and ingenious invention to bring forth this battery of no regrets.

Campbell batteries represent a solution of the very common battery ill—post leakage.. The construction that has achieved this notable result is illustrated in the lower left-hand corner. Note No. 1, the heavy rubber gasket pressed firmly around the post and resting upon the terminal post flange on the uniseal cover. No. 2 shows the sealing compound poured on top of gasket No. 1. No. 3 shows another heavy gasket. No. 4 is a lead antimony washer, a drive fit between the terminal post and cover. No. 5 shows a large vent plug hole which facilitates refilling the battery. This is only one of the important improvements in battery construction featured in Campbell Batteries.



Campbell Battery Terminal Post

If a Better Battery Were Possible—It Would Be a Campbell

No result is accepted as "good enough" in building or testing Campbell Batteries—it must be "perfect." That means proper capacity discharge, and the strength and endurance obtained only from scientific construction and finest materials.

DEALERS: Here is a storage battery you can afford to recommend and sell because it will back you up and make good both with profit and service.





CAMPBELL ELECTRIC CO.

Kansas City, Missouri

Stewart Wire Wheels

"That Hub Makes Stewart Wheels Beat All the Rest"

"That hub is positive assurance that the Stewart Wire Wheels on your Ford will not come off by accident. Inside that hub are reverse tapers locked in place by a one-eighth turn of the wheel. They take up all the strain that in most other wire wheels is thrown directly against a frail hub-cap.

"That vital factor of *absolute safety* against dangerous accidents is what makes my Ford customers use Stewart Wire Wheels in preference to any other wire wheel on the market."

Stewart Wire Wheels have other advantages beside their perfect safety. They add distinction to your Ford by their fine appearance. They reduce tire wear and increase tire and gasoline mileage, because they reduce by half the unsprung weight of the car. Stewart Wheels bring big-car comfort to your Ford in city driving or on the road.

You will find Stewart Wire Wheels to be the best accessory investment you ever made. Order a set from your dealer today. They can be obtained through any recognized Ford agent.

Put Stewart Wheels on Your Ford

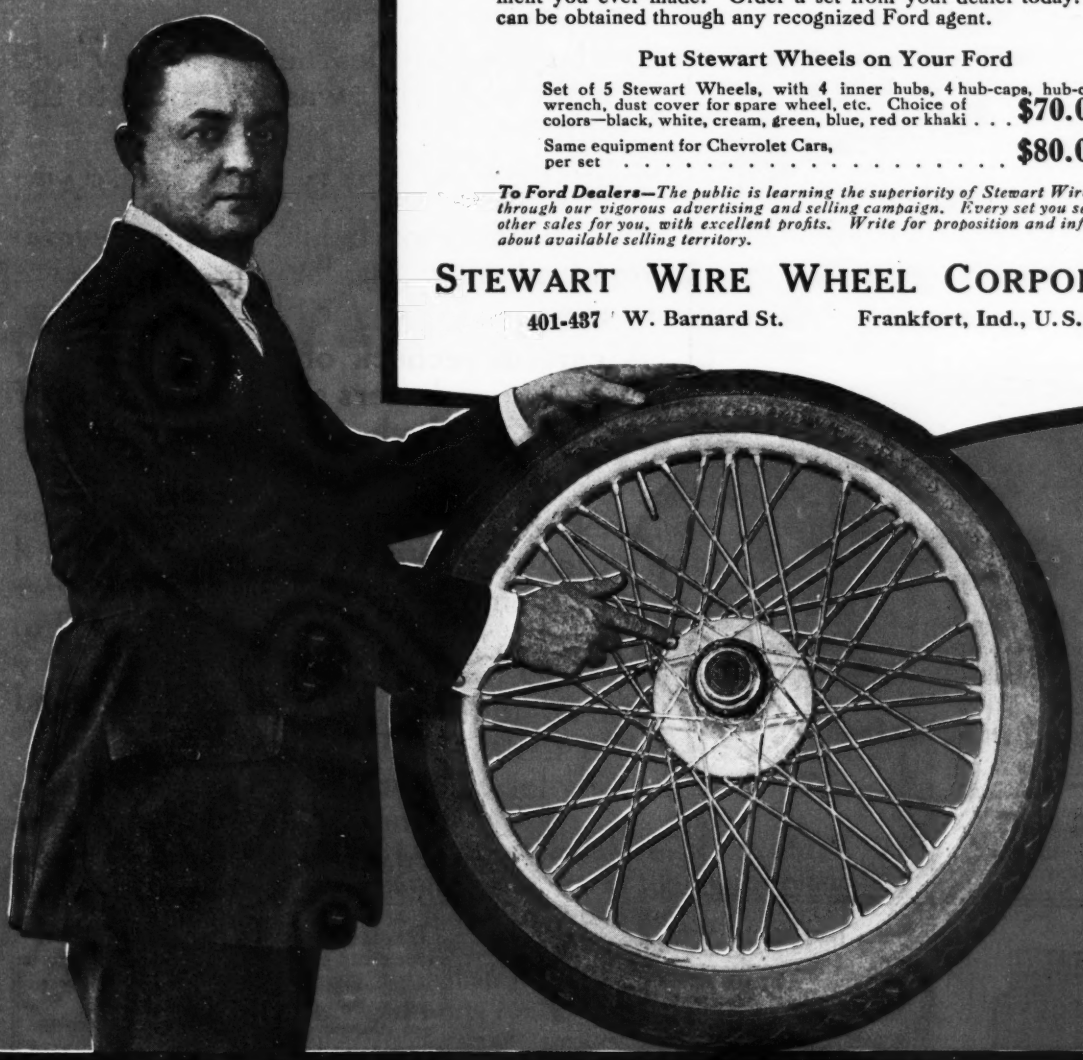
Set of 5 Stewart Wheels, with 4 inner hubs, 4 hub-caps, hub-cap wrench, dust cover for spare wheel, etc. Choice of colors—black, white, cream, green, blue, red or khaki . . . **$70.00**

Same equipment for Chevrolet Cars, per set **$80.00**

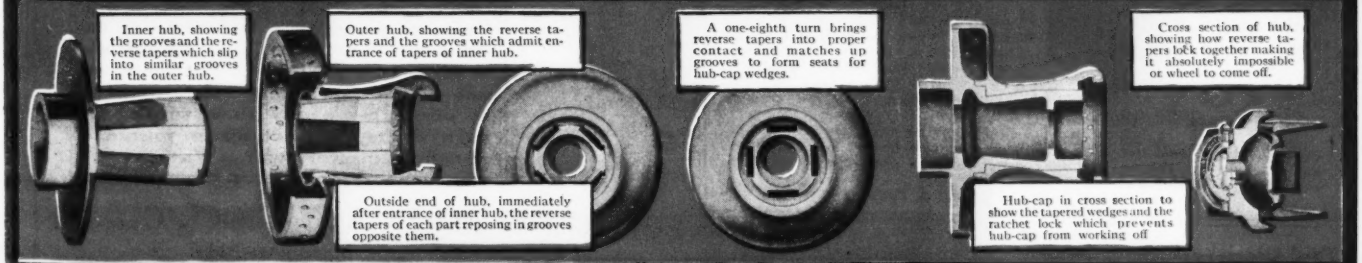
***To Ford Dealers**—The public is learning the superiority of Stewart Wire Wheels through our vigorous advertising and selling campaign. Every set you sell makes other sales for you, with excellent profits. Write for proposition and information about available selling territory.*

STEWART WIRE WHEEL CORPORATION

401-437 W. Barnard St. Frankfort, Ind., U. S. A.



The Stewart Hub Makes Safety Sure



The Wheel That Won't Come Off

Defender Spring Shock Absorber

For Ford Cars and Trucks





Fully protected against infringement and licensed under patents No. 1,140,671; 1,293,425



Price, $4.00

Defender New Model G L
Locks for Fords

It is "forget-proof" as well as thief-proof. When you turn off switch, car is locked and grounded. One simple operation. No temptation to leave car unlocked "for just a minute." When **locked, no thief** can pick it, for it is equipped with an 18-tumbler cylinder (keys fitted both sides) and no two keys alike.

Locks the coils as well as the car. (*Always look for the strap over the coil box.*) Grounds the entire electrical system. (*Locks which merely short-circuit can be easily wired around.*)

Dealers—Order Defender Model G Today

Ford Users—Ask Your Dealer
Descriptive Literature Sent on Request

With the ROLLER BEARINGS!

Defender Spring Shock Absorbers for Ford cars enjoyed an unusual sales record their initial season.

Dealers quickly learned that they sold at sight and, what was still more to the point

THEY STAY SOLD AND REPEAT!

In a single month last spring, several hundred new dealer accounts were opened on Defender Shock Absorbers.

A careful recheck of this same list of dealers shows that 86% of them reordered when our salesmen called.

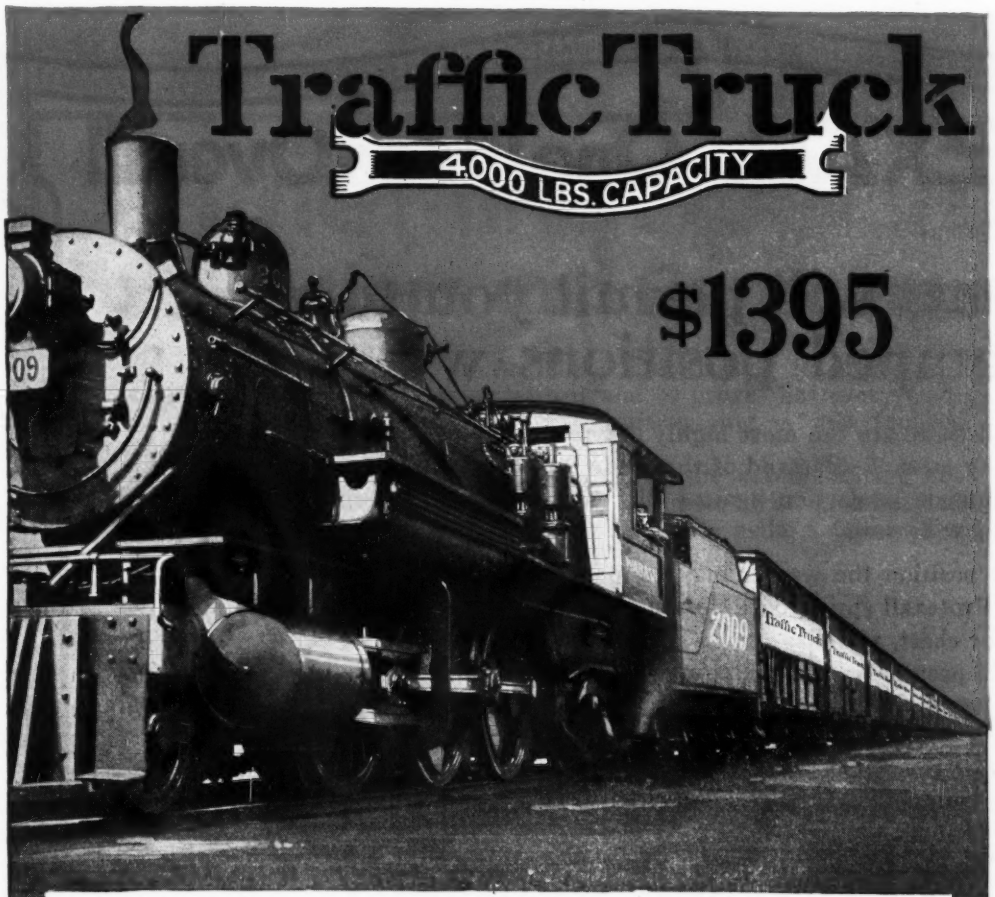
More than 50% of these same dealers have had shipments of Defender Shock Absorbers within the past thirty days. They are still going strong, **and gaining.**

If you require stronger evidence than the above record, you will simply have to try a set of Defenders.

Dealers—Write for Trial Offer.

Sell yourself this winter! Be ready to sell your customers next season! We are planning a production schedule for next year which makes us desirous of having you thoroughly "sold" on Defender performance before we reach the peak of next year's selling season. Order a trial set today. Put them on one of your own cars. Return them at our expense any time within 30 days, if they are not up to your expectations in every way. Write us.

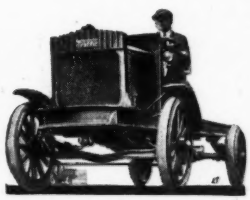
DEFENDER AUTO-LOCK CO.,
5th Floor, Marquette Bldg.
DETROIT, MICHIGAN



A Train-load

To meet the demand of Iowa farmers, this entire train load of Traffic Trucks was shipped on September 15th to Hanson & Tyler Auto Co., of Des Moines, Iowa. It enabled them to keep pace with their promises for the immediate delivery of Traffics.

It conveys, in a measure, evidence of the enormous production of the Traffic plant on one model of the standard capacity, which is wholly responsible for our ability to furnish a quality truck of standardized units for hundreds of dollars less ***—the lowest priced 4,000-lb. capacity truck in the world.***



Traffic Motor Truck Corporation
St. Louis, U. S. A.

Largest exclusive builders of 4,000-lb. capacity trucks in the world

"Horse Sense"



Foresight is the searchlight of opportunity and Traffic dealers are profiting by reason of possessing this rare qualification.

Standardize with the Traffic, the standard size.

Everybody is sold on the general value of automotive machinery, but it was left to the Traffic to demonstrate both value and economy in a motor truck.

To order a car load of Traffic Trucks is a surety that you eventually will order them by the train load—others are doing it, why not you? Secure the Traffic Contract for *your territory* before it is signed over to someone else.

The Traffic is the lowest priced 4,000-lb. capacity truck in the world. Built of standardized units.

Traffic Specifications

Red Seal Continental 3¾ x 5 motor; ***Covert transmission;*** multiple disc clutch; ***Bosch magneto;*** 4-piece cast shell, cellular type radiator; drop forged front axle with ***Timken roller bearings; Russel rear axle,*** internal gear, roller bearings; semi-elliptic front and rear springs; 6-inch U-channel frame; ***Standard Fisk tires, 34 x 3½ front, 34 x 5 rear; 133-inch wheelbase;*** 122-inch length of frame behind driver's seat; oil cup lubricating system; chassis painted, striped and varnished; driver's lazy-back seat and cushion regular equipment. Pneumatic cord tire equipment at extra cost.

Chassis $1395 factory

Notice to Dealers

It is Traffic policy to make direct connections in every city, town and village throughout the United States. Wire for territory you want and if open come to the factory and see the Traffic produced and perform.

The Traffic is produced by the largest exclusive builders of 4,000-lb. capacity trucks in the world.

PROTEXALL One Piece Overall

Garments will permit you to work in cramped positions with ease

Protexall Overall Suits are the most highly developed line of one-piece garments on the market. They meet the demand of the trade for comfortable, durable garments, which afford complete protection against dirt and grease, and permit working in cramped positions with ease.

No matter what position the wearer may be in, all muscles are completely free, due to the exclusive Protexall spring-back design, which eliminates all binding or pulling across the back or chest, and also at the seat and neck. The finest of closely woven government khaki provides a staunch covering—cool in summer, and warm in winter. Protexall Overall Suits are providedwith a three-way collar, two-button cuff, buttoned side slits, four button box fly, front opening from neck to crotch and convenient pockets to meet the various needs. All seams and edges are double stitched and felled, giving double strength without raw edges.

The Protexall Company

Abingdon, Illinois



Something Special
For Dealers and Garagemen

To introduce NEUMANN'S Anti-Leak Piston Ring to dealers and garagemen who are not familiar with it and to prove that every claim we make for this remarkable high compression ring is well founded, we are making this special offer—

We will send one complete set of rings at the manufacturing cost price of 62c each. This offer is made only to dealers who have not used NEUMANN'S Anti-Leak Piston Ring. Could we make a fairer offer?

NEUMANN'S ANTI-LEAK PISTON RING

The big, dominating feature of this ring is the gap, which is cut at an angle of 8/1000 of an inch—4/1000 of an inch in each corner of the gap. As the ring wears or expands in the cylinder the tongues of the ring slide against each other, thus assuring a perfect fit at any point of wear.

This ring is hammered, heat treated and specially treated with chemicals. **It is the only ring that does not lose its efficiency through wear.**

Take Advantage of This Special Offer

Examine the NEUMANN Ring closely, try it out in your car, give it every test known for determining the efficiency of a piston ring. Ask your mechanics about it. We want to prove to you beyond all doubt that this is the ring for you to sell. Send for a set at once and the details of our proposition that is a money-maker. Fill in and send the coupon.

NEUMANN BROS.
Clinton, Iowa
(Lyons Station)



SEND THE COUPON RIGHT NOW

NEUMANN BROS.,
Lyons, Iowa.

Send me a set of Neumann's Anti-Leak Piston Rings at the manufacturing cost of 62c each. Size ..... inches.

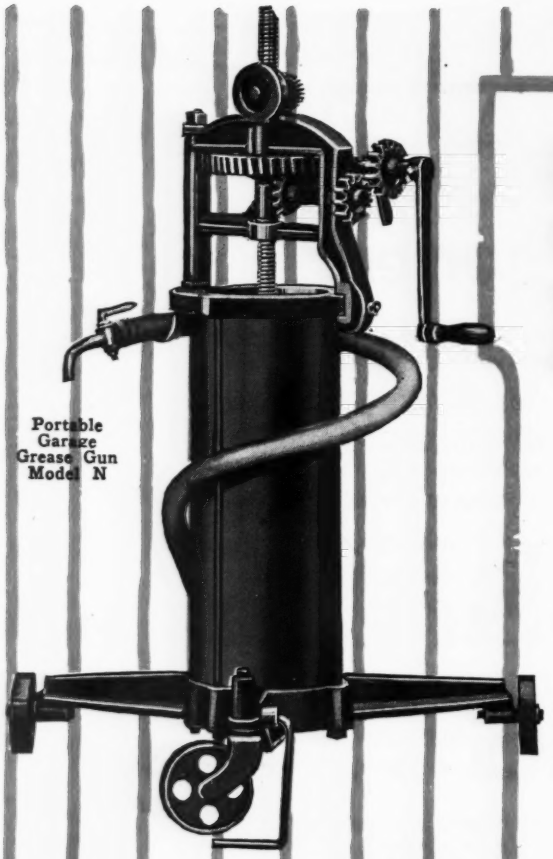
Name .....

Address .....

City ..... State .....

SHOP EQUIPMENT

THAT MAKES JOBS PAY



Portable Garage Grease Gun Model N

EKERN'S PORTABLE GARAGE GREASE GUN MODELS N OR K

Portable, practical and clean guns. The EKERN are the only hand-operated guns on the market that will work any weight of grease as well as oil.

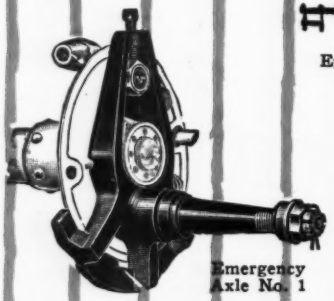
Model K holds 20 lbs. grease or 2½ gals. oil
Model N holds 56 lbs. grease or 7 gals. oil

EKERN'S EMERGENCY AXLE STUBS

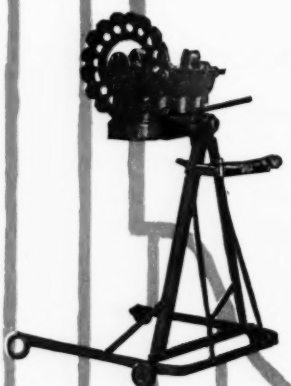
With any one of the Ekern emergency axles a car with a broken axle can be placed on its own wheels in a few minutes' time. No. 1 and No. 3 are for Ford cars. No. 2 can be attached to any car in ten minutes.



Emergency Axle No. 2



Emergency Axle No. 1



Ford Motor Stand

EKERN'S PORTABLE WORK BENCH, MOTOR STAND, SHOP BENCH, MOTOR SUPPORT AND AXLE ATTACHMENT

EKERN'S PORTABLE WORK BENCH is a complete stand fully equipped with two large trays, a machinists' vise, and a motor stand.

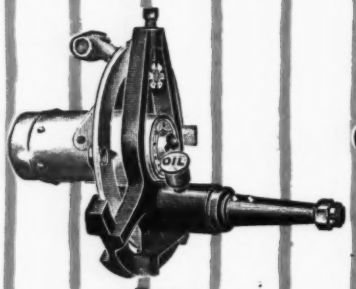
EKERN MOTOR STAND is for repairing Ford motors. EKERN' SHOP BENCH MOTOR SUPPORT is for holding Ford motors on any shop bench. EKERN AXLE ATTACHMENT for repairing axles wil fit either the work bench, the motor stand or shop bench motor support.

Get acquainted with our "money-making" specialties. Send for our complete catalog.

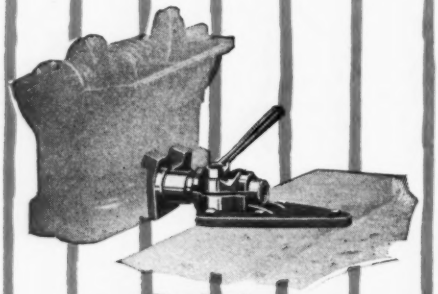
Your jobber can fill your order. Full particulars on request.

H. G. Paro Co.

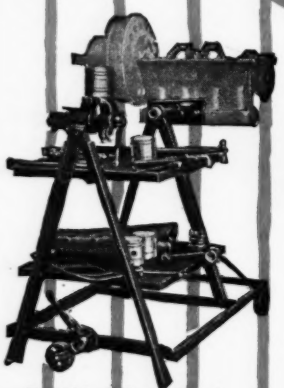
1412-14 S. Michigan Blvd., Chicago, Ill.



Emergency Axle No. 3



Shop Bench Motor Support for Fords



Portable Work Bench and Engine Stand



Axle Attachment for Work Bench, Motor Support and Motor Stand



Portable Garage Grease Gun Model K

Dominate the Gasoline Business In Your Town

Proper methods, backed by proper equipment, will put you on the firing line as the leading gasoline merchant in your town. Tackle the business of selling gasoline in a modern, progressive way. Get the confidence of the car owners—let them know you are giving the best service possible. Build up your VOLUME of gasoline business—because in VOLUME lies your big chance of greater profits.

Back your business methods with WAYNE Equipment. Reduce the time necessary to serve your customers. Car owners appreciate quick service and they will go where they can get it. That means YOUR place of business if you have WAYNE Pumps, the speediest equipment you can buy. And as a means of getting the car owner's confidence, WAYNE Pumps show plainly how much gasoline is being measured out. TELL THEM TO "WATCH THE DIAL."

And here are more WAYNE features that will help you to dominate the gasoline business in your town—gear driven meters, continuous forward motion of handle, push button quantity stops, cylindrical sliding housing counterbalanced, six-inch clock-like discharge register, graduated computing scale, and a two-year guarantee.

Write for bulletin 276 M. A. and complete information

Wayne Oil Tank & Pump Co.

518 Canal St. Fort Wayne, Ind.

Wayne

Honest Measure Pumps





CANT BE WRECKED BY WEIGHTY LOADS OR SEVERE WRENCHES

Of Interest to Builders of Passenger Cars or Trucks

You, and you alone, are held responsible for every piece and part of the machine you produce. From tire to top you get praise or blame, according to the satisfaction or dissatisfaction of the user. Higgins Quality Springs always "reflect to your credit." There's positive security in their strength, pliancy and design. They can't break. They don't wear out. Through all degrees of service, they serve faithfully—shield the mechanism of car or truck against road and load shock—give an easy undiminishing swing of comfort that increases riding pleasure *and* reduces travel and trucking costs.

Made a new way—and made a better way—no center hole, bolt or hump. No breakage in any section. Marvelous resiliency, endurance and tensile strength acquired through our exclusive process of heat treatment.

Specifications of your needs as a manufacturer, will bring facts which will convince you that Higgins Quality Springs will most economically, most satisfactorily fill your requirements.

Jobbers and Dealers in Replacement Springs

who strive to give their patrons accessories of highest excellence should acquaint themselves of the many excellent selling advantages to be had in the Higgins Line.

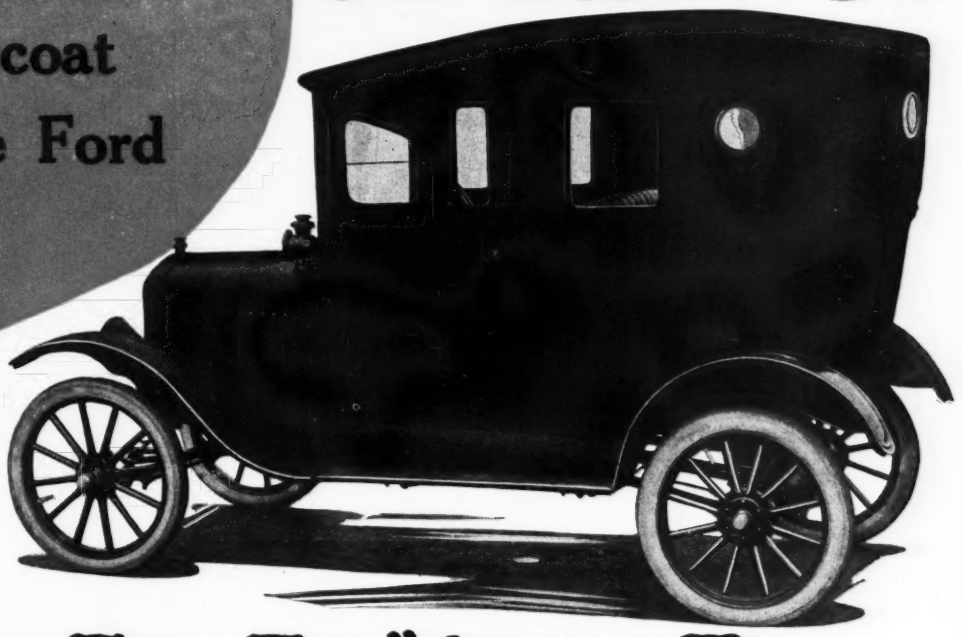
Particulars and catalog listing Replacement Springs for all makes of automotive vehicles, upon request.

Higgins Spring & Axle Company
Dept. 1121
RACINE, WISCONSIN

HIGGINS QUALITY SPRINGS
For all PASSENGER CARS AND TRUCKS

NOW IS THE TIME TO SELL IT

It's a Tailormade Overcoat for the Ford



Manufactured under Trumbly Patents

"OVER THE TOP" AUTO TOP

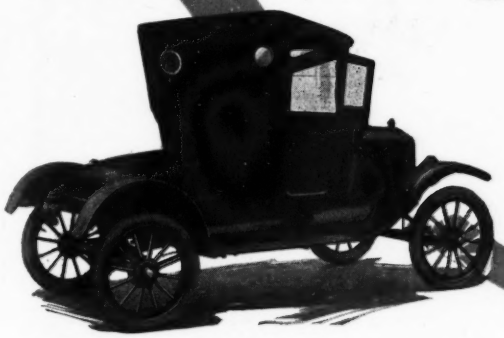
Right now Ford owners are buying winter tops. Are **you** getting your slice of this unusually profitable business? Are you selling the right top?

Here is just what Ford owners want—the "Over The Top" Auto Top. It slips on over the regular Ford top and forms an absolutely weather-tight winter enclosure which is everything that could be desired. It is unusually good looking and makes the car much more attractive. No mechanical work or attention is necessary—anyone can put it on in a few minutes—shows no marks of attachment.

Your territory is valuable. This is a live seller. It's **new**—it's **novel.** Send the coupon for details.

OVER THE TOP AUTO TOP

Also Furnished for Roadsters



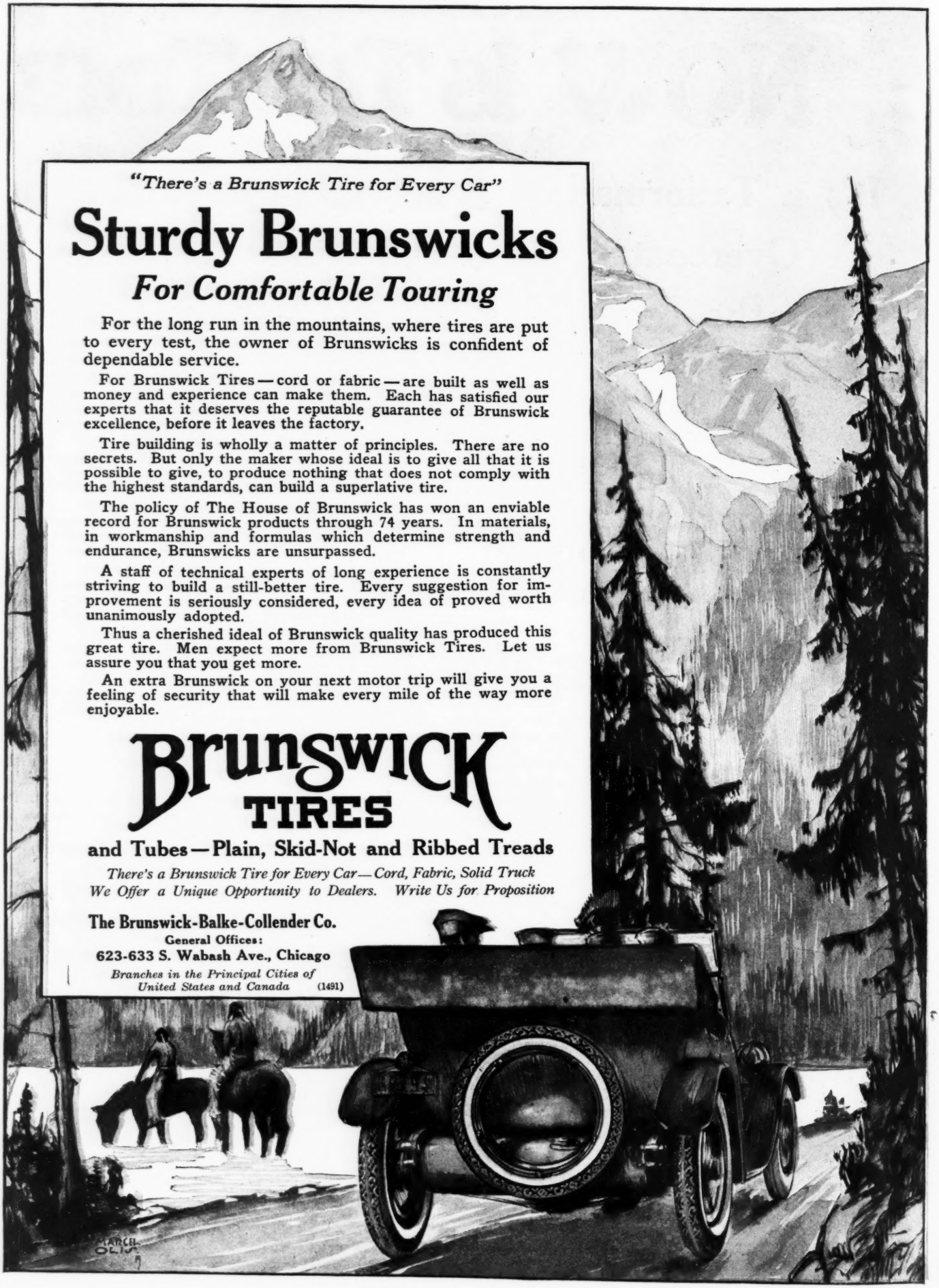
Doors and Tops are Fastened so they operate as a unit.

AUTO REMODELING CO.
1503 S. Michigan Ave., Chicago, U. S. A.
Manufacturers of Remo Raceabout Bodies for Fords.

AUTO REMODELING COMPANY
1503 S. Michigan Ave. Chicago, U. S. A.

I am interested in the "Over the Top" Auto Top for Ford cars. Send me full particulars.

Name .....
Address .....
City .....
State .....



"There's a Brunswick Tire for Every Car"

Sturdy Brunswicks

For Comfortable Touring

For the long run in the mountains, where tires are put to every test, the owner of Brunswicks is confident of dependable service.

For Brunswick Tires — cord or fabric — are built as well as money and experience can make them. Each has satisfied our experts that it deserves the reputable guarantee of Brunswick excellence, before it leaves the factory.

Tire building is wholly a matter of principles. There are no secrets. But only the maker whose ideal is to give all that it is possible to give, to produce nothing that does not comply with the highest standards, can build a superlative tire.

The policy of The House of Brunswick has won an enviable record for Brunswick products through 74 years. In materials, in workmanship and formulas which determine strength and endurance, Brunswicks are unsurpassed.

A staff of technical experts of long experience is constantly striving to build a still-better tire. Every suggestion for improvement is seriously considered, every idea of proved worth unanimously adopted.

Thus a cherished ideal of Brunswick quality has produced this great tire. Men expect more from Brunswick Tires. Let us assure you that you get more.

An extra Brunswick on your next motor trip will give you a feeling of security that will make every mile of the way more enjoyable.

BRUNSWICK TIRES

and Tubes — Plain, Skid-Not and Ribbed Treads

There's a Brunswick Tire for Every Car — Cord, Fabric, Solid Truck
We Offer a Unique Opportunity to Dealers. Write Us for Proposition

The Brunswick-Balke-Collender Co.
General Offices:
623-633 S. Wabash Ave., Chicago
Branches in the Principal Cities of United States and Canada (1491)



FAULTLESS
Touring Car Top
$125.00

DEALERS—

RIGHT NOW is the Time to Make Some

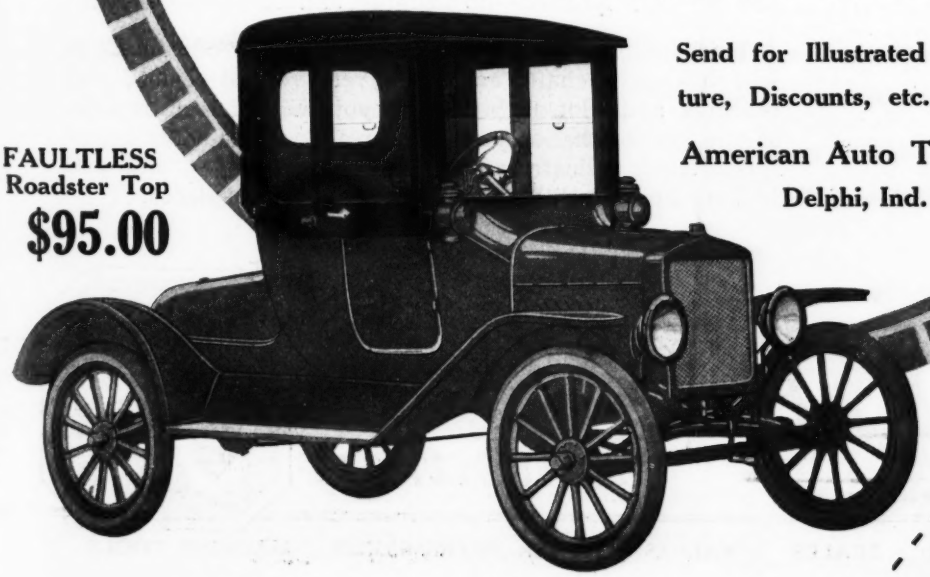
Real Money Selling FAULTLESS TOPS

For Ford Touring Cars and Roadsters

As winter approaches, Ford owners are beginning to look for a good, substantial top which will furnish convenience and comfort so necessary for winter driving. FAULTLESS TOPS are well built. The frame is made of hard wood, screwed and glued together—the back is of 20-gauge steel. Panels and doors are made of poplar and are glued. These tops are so well made that **they will not rattle or come apart**—a most common fault of the average top for Fords.

It doesn't take special equipment or a skilled mechanic to install the FAULTLESS TOP, and they are so good looking that the average Ford car owner will buy on sight. Here's a chance to do a volume of Auto Top business in your territory, and a demonstrator on exhibition will keep you busy taking orders. Don't put this off, because the season is here, and the market was never better.

Prompt delivery immediately upon receipt of order



FAULTLESS
Roadster Top
$95.00

Send for Illustrated Literature, Discounts, etc., NOW

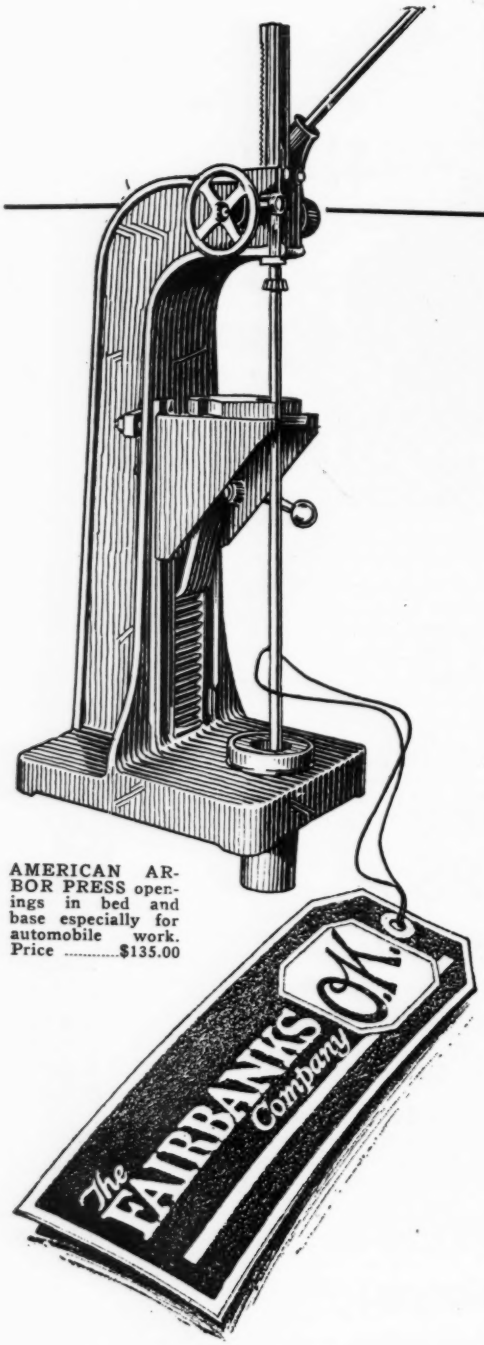
American Auto Top Co.
Delphi, Ind.

American Auto Top Co., Delphi, Indiana

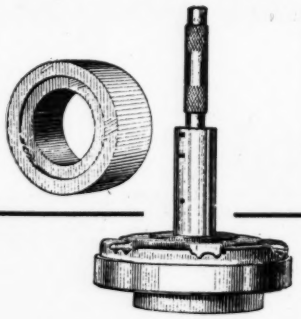
Gentlemen:
Show me how I can make money selling FAULTLESS Tops in my territory.

Name .....

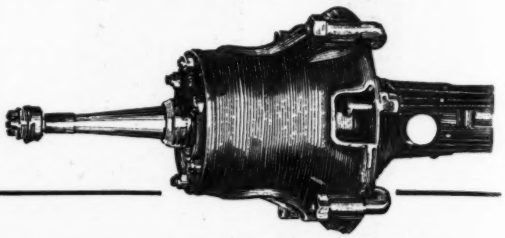
Address .....



AMERICAN ARBOR PRESS openings in bed and base especially for automobile work. Price $135.00



TRANSMISSION DRUM SUPPORT RING showing how it is used. Price.....$2.50



A handy tool for emergency work—FORD EMERGENCY WHEEL CLAMP. Four hook bolts clamp it to a rear axle housing when axle or transmission fails. Standard Ford ball races permit the use of a regular Ford front wheel when towing in a disabled car. Price $15

A Tool of a Thousand Uses

The next time you have to remove a bushing from a Ford transmission drum, will you hunt around for a piece of pipe, "nearly" the right size, then get the sledge and try to drive out the tight-fitting sleeve?

You know the risk of a cracked drum, and of smashed fingers, but unless you have a

Fairbanks Arbor Press

you must take the chance, or struggle to make a vise do something it was never intended for.

Now try the Fairbanks way. Put the drum on the table of a Fairbanks Arbor Press, rest it on a Supporting Ring, and adjust the table height by the screw below it. Put the proper Bushing Driver in place, and bring down the handle. With a 60 to 1 leverage you can apply five tons just where you want it—smoothly and evenly. Out comes the bushing and the job is finished—no sledging, and no damage done.

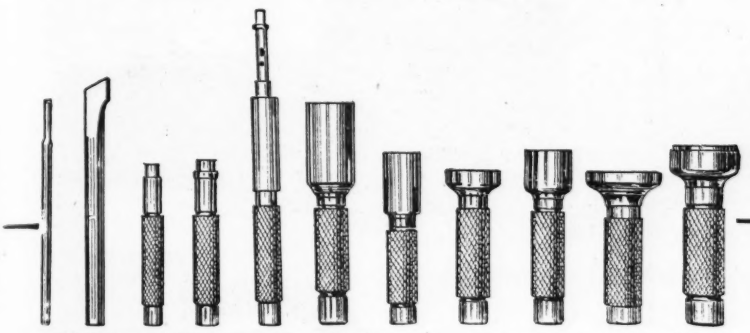
A Fairbanks Arbor Press will do many other odd jobs. It will straighten shafts and axles, remove and replace ball bearings, and a lot of things that you will think of as soon as you get this handy tool in your shop. Read this list of special tools (illustrated on the opposite page), and you will see how much pipe-and-sledge work it replaces.

The FAIRBANKS Company

Sole Distributors for
The Service Station Equipment Company
The Hempy-Cooper Manufacturing Company
The Peterson Engineering & Manufacturing Co.
and other manufacturers of garage equipment.

O.K.

MILL, MINE AND RAILWAY SUPPLIES SCALES VALVES POWER TRANSMISSION MACHINE TOOLS



BUSHING DRIVERS FOR PRESS USE. Price, per set $30.00
(Also sold separately.)

Special Tools for Fairbanks Arbor Press

Spindle Body Bushing Remover
Inner or Outer Ball Race Remover
Spindle Arm Bushing Driver
Triple Gear Bushing and Wrist-Pin Driver
Transmission Drum Bushing Drivers
Timing Gear Driver
Propellor Shaft Bearing Sleeve Driver
Front Wheel Ball Race Drivers
Driven Gear Puller Block

and it will stand up to severe service, too. Its frame is a heaving casting; the bed adjusting screw is liberally proportioned, and there are two reinforcing bolts to clamp the table solidly to the frame.

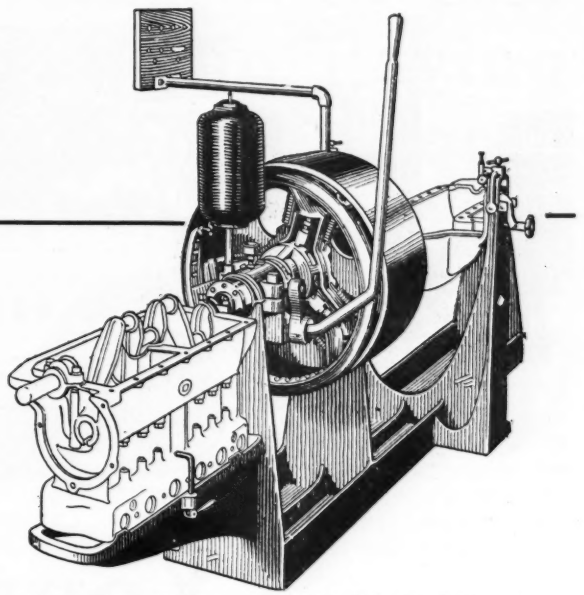
Stop and think of all the places you could have used an American Arbor Press on last week's work. Then order one from the nearest Fairbanks Branch House—and you won't have to fall back on hammer and chisel to break the next rusted driving fit that comes your way!

THE FAIRBANKS COMPANY

Administrative Offices—New York

Albany	Chicago	Paterson	Scranton
Baltimore	Detroit	Philadelphia	St. Louis
Birmingham	Hartford	Pittsburgh	Syracuse
Boston	Newark	Providence	Utica
Bridgeport	New Orleans	Rochester	Washington
Buffalo	New York		

Havana, Cuba; London, England; Birmingham, Eng.; Glasgow, Scotland; Paris, France



AMERICAN JUNIOR BEARING BURNING-IN and Motor Test Stand—Saves 5 to 7 hours in finishing a set of crankshaft bearings. Price.....$197.50

"Fairbanks OK" Time-Savers for the Ford Shop

Automobile Engine Testers
Bearing Burning-in Machine for Ford and Fordsons
Motor Test Stands
Engine and Axle Stands
Bearing Boring Machines and Re-Babitting Jigs
Cylinder Reboring Machines for Fords and Fordsons
Straightening Presses
Arbor Presses
Power Grinders
Air Compressors
Transmission Reaming Machines
Special Ford Reamers
Rear Axle Sleeve Pullers
Radiator Test Plugs
Piston Clamps
Connecting Rod Straightening Jigs
Bench Motor Clamps
Rear Axle Pinion Gear Presses
Pinion Gear Pullers
Piston Bushing Reamers
Crank and Cam Shaft Testing Machines
Emergency Wheel Clamps
Wheel Pullers
Valve Port Renewing Tools
Bushing Drivers
Turning Bars
Speed and L Wrenches
Special Jacks
Rim Tools
Tow Bars
Combination Electric Drills and Valve Grinders
Visible Measuring Gasoline Pumps
Special Ford and Fordson Tools and Machines

The FAIRBANKS Company

O.K.

Sole Distributors for
The Service Station Equipment Company
The Hempy-Cooper Manufacturing Company
The Peterson Engineering & Manufacturing Co.
and other manufacturers of garage equipment.

TRUCKS AND WHEELBARROWS ENGINES AND PUMPS AUTOMOBILE AND SERVICE STATION EQUIPMENT



Your Reason

You will like the Columbia Six—just as all Columbia dealers like it.

You will like it because it is good to look upon—because its aristocratic, substantial appearance makes a good and a lasting impression upon the automobile prospect right from the start.

You will like it because it gives you so many good things to sell all in one car. From the big things, like the Red Seal Continental Motor, down to the smallest details, you will find the Columbia Six composed of well-known leading units. There is not a "weak link" in it.

And, as all Columbia Six dealers do, you will like the fact that the owners of Columbias develop a warm and enthusiastic friendship for their cars—an affection which is more strongly cemented the longer their Columbias are in use.

For example, we do not know any Columbia dealers who keep a hand-picked Columbia owner list to which to refer prospects. They all say to the prospect simply this—"Ask any Columbia owner about his car—stop him at the curb or in the club."

Columbia Motors Company is always on the lookout for dealers of the high-grade type and standing who appreciate this sort of car.

For the Mechanically Inclined

Timken Axles—Continental Red Seal Motor—Detroit Pressed Steel Company Frame—Radiator with "Sylphon" Thermostatically Controlled Shutters—Spicer Universal Joints—Borg & Beck Clutch—Durston Transmission—Detroit Steel Products Company's Springs—Gemmer Steering Gear—Auto Lite Starting & Lighting—Atwater-Kent Ignition—Stromberg Carburetor—Prest-O-Lite Storage Battery—Painting and Trimming by The American Auto Trimming Co.—Pantasote Top—Firestone Tires.

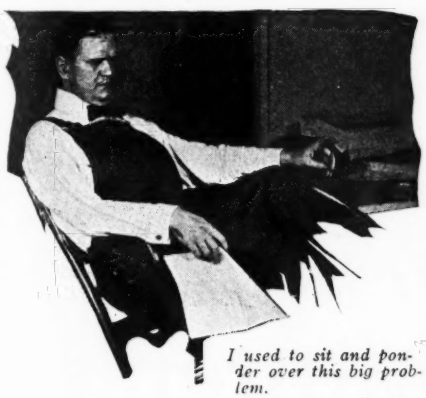
Prices—Five-Passenger Touring Car, $1695.00; Four-Passenger Sport Model (five wire wheels included), $1845.00; Two-Passenger Roadster (five Disteel wheels included), $1845.00; Four Passenger Coupe, $2850; Five-Passenger Touring Sedan, $2850.00. Prices F.O.B. Detroit.

COLUMBIA MOTORS CO. **DETROIT, U. S. A.**

Columbia Six

"—And Now, On An Investment Of Less Than $25, I Have A Big Paying Business—With No Competition."

A Graphic Story of a Repairman's Rapid Rise to Prosperity. By Himself



I used to sit and ponder over this big problem.

LESS than a year ago I was just a small repairman, struggling from day to day to make ends meet out of the earnings of my little shop. Living costs were constantly on the increase, but my business stayed just about where it was. I couldn't get very far ahead because my whole path was choked with competition. I used to sit and ponder over this big problem, wondering where it was all going to lead to.



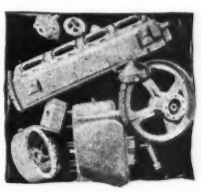
I saw so many costly aluminum parts scrapped because of a small break or ruined by welding.

THEN one day I read an advertisement about aluminum repairs. It looked like the real thing to me, for I had seen so many costly aluminum parts scrapped because of a small break, and I realized that if anybody could make repairs that would stand up and not distort the sensitive metal, he could do a clean-up business. So I took the ad on faith and sent a money-order for $24.50—it was all I felt I could afford—for 7 lbs. of Peters' Aluminum Brazing Solder. When it came I started some experiments, and found that it was all that was claimed for it; a perfect aluminum solder that any unskilled workman could apply easily and quickly and make a clean, sound repair, by following the simple directions.



"Then I bought a few pounds of Aluminum Brazing Solder and did some experimenting."

I TOOK Mr. Peters' advice and got the other repairmen in town to send me their aluminum jobs. And I circularized all the motorists—a few at a time, until I had covered the whole list. It wasn't long before I became known as a specialist on aluminum repairs. The wonderful results produced by Peters' Aluminum Brazing Solder were creating a real sensation, and I began to see the first real *rush of business* that I had ever known. I was able to charge a big fee for every job, because nobody else was able to do the work, and the money I saved the car owners on replacements made the charge seem small.



There are nearly sixty different aluminum parts which can be quickly and easily repaired with Aluminum Brazing Solder.

AND now, on that original investment of less than $25, I have built up a big paying business, with no competition to struggle with—a profitable, growing trade that is *all my own.*"

Aluminum Brazing Solder Company

1303 Widener Bldg., Philadelphia, Pa.



"And It All Came from Mailing a Coupon to the Aluminum Brazing Solder Company."

Aluminum Brazing Solder Co., 1303 Widener Bldg., Philadelphia, Pa.

Tell me, without obligating me in any way, how I can build up a profitable aluminum repair business.

Name .....

Address .....

City or Town and State.....

Present Occupation.....

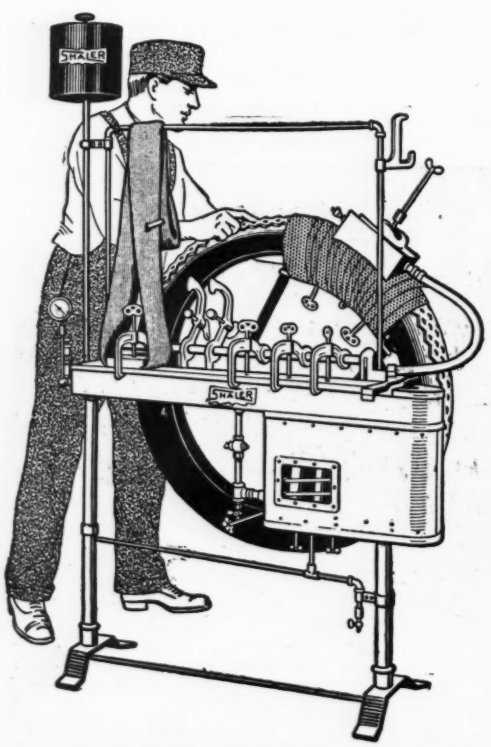


Make Big Profits This Winter

Tire repairing has no dull season—millions of tires must be repaired this winter before they can be used next spring.

Hard wear during winter and extreme cold have a detrimental effect on tires—they need greater care—more careful attention and frequent repairing.

A few feet of space in any spare corner devoted to vulcanizing will bring in enough money to pay all your overhead—and even more.



Type "NPR." Price $70, subject to trade discount.

SHALER Shop Vulcanizer

is the most practical vulcanizer made for garages and tire repair shops. Complete outfit, vulcanizer, tools and repair material cost less than $100—and this vulcanizer will do just as much work—and as good work—as machines that cost five or six times as much.

Large capacity—you can mend 12 casings and 200 tubes in one day. Uses Wrapped-Tread method used by large tire manufacturers. Automatic Heat Control saves time and trouble—prevents damaging tires.

SHALER Vulcanizing Plants are equipped either with gas or with gasoline burners—or you can get a SHALER Electric Vulcanizer that can be attached to any electric light socket. A boy can learn to operate it.

Your Jobber Sells SHALER Vulcanizers

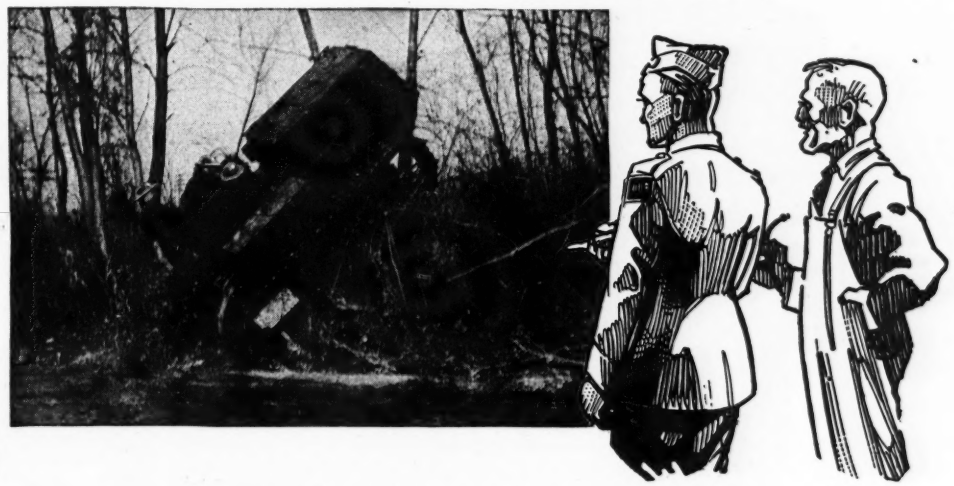
Place your order with him now—or write him for full information about the SHALER Type NPR Vulcanizer. Write us quick for catalog of the complete line of SHALER Vulcanizers for Tire Repair Shops, Garages and Motorists' Use.

C. A. SHALER CO., 252 Fourth St., Waupun, Wis.

Oldest and Largest Manufacturers of Vulcanizers in the World

HOLT
PEORIA STOCKTON

Your customer's boy *saw* the "CATERPILLAR" *in action*



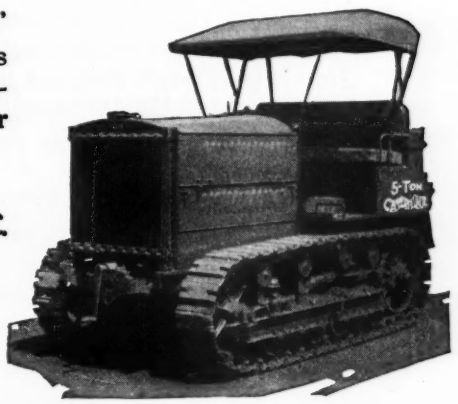
He is selling his "dad" on the "Caterpillar" tractor every day. When they talk of buying a tractor for the farm, the boy tells the story of how it performed overseas.

The 5-Ton and 10-Ton "Caterpillars" are duplicates of the tractors used in war work. You can sell "dad" the same tractor that his "boy" drove or saw in the service.

Farmers by the hundreds of thousands, in every part of the country, are hearing these first-hand stories about the "Caterpillar" and are interested. We know this from the letters we receive.

Farmers want a tractor they can rely upon. The "Caterpillar" has proven its dependability. It is the kind of tractor every good farmer wants.

Selling the highly efficient "Caterpillar" offers an attractive, permanent business to every dealer in power farming equipment. **You are invited to write us for our contract and terms.**



The HOLT Manufacturing Co. Inc.

There is but one "CATERPILLAR"—HOLT builds it.

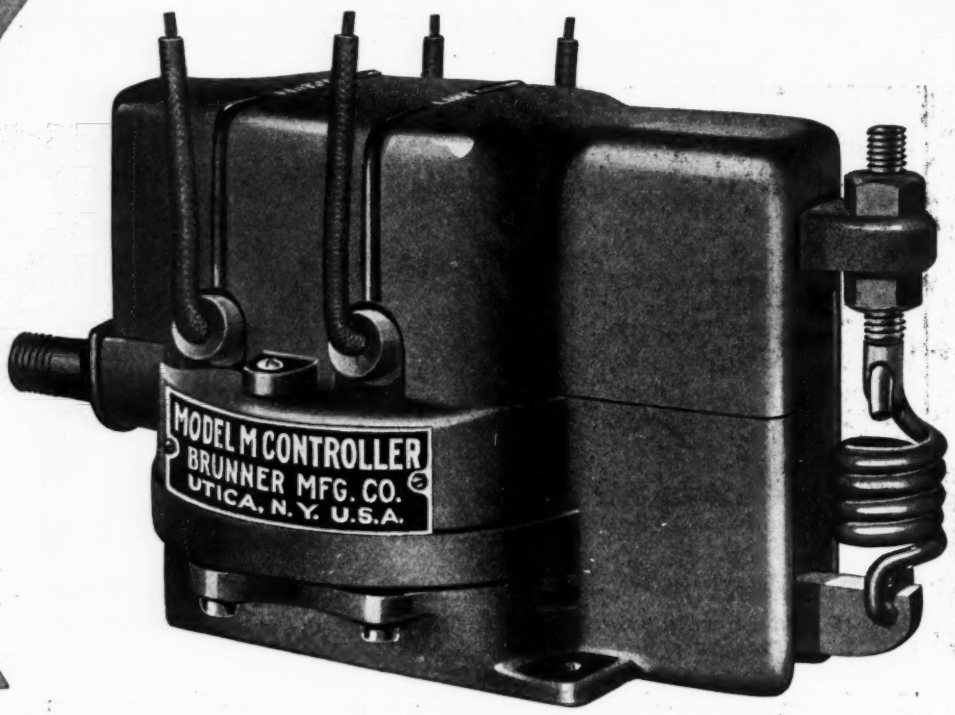
Peoria, Illinois

Factories: Peoria, Ill. and Stockton, Cal.

Branches and Distributors:

Atlanta Ga.	Memphis, Tenn.	Spokane, Wash.
Fargo, N. D.	New York, N. Y.	Wichita, Kas.
Kansas City, Mo.	Omaha, Nebr.	Calgary, Alberta
Los Angeles, Cal.	San Francisco, Cal.	London, E. C.

BRUNNER



Controlled Air Service

Your air compressor is in the back room---your profitable time is spent in the front. Suppose you start your compressor and are called away. What will happen if it is not automatically controlled ?

1st - you may have to leave important, profitable work to go back to shut it off -- several times a day this happens. A Brunner Controller will pay for itself in the loss of time and profit.

2nd - If your compressor has safety valves, these will open when the proper pressure is reached then you are just pumping into the atmosphere - burning up current and wearing out your machine. A Brunner controller will prevent this.

3rd - If your outfit does not have safety valves, the pressure may reach the danger point. A Brunner controller will avoid damage and personal injury.

Suppose on the other hand you forgot or neglected to turn the compressor on, you'll have disappointed customers. A Brunner controller automatically maintains a proper working pressure which means every customer served without delay.

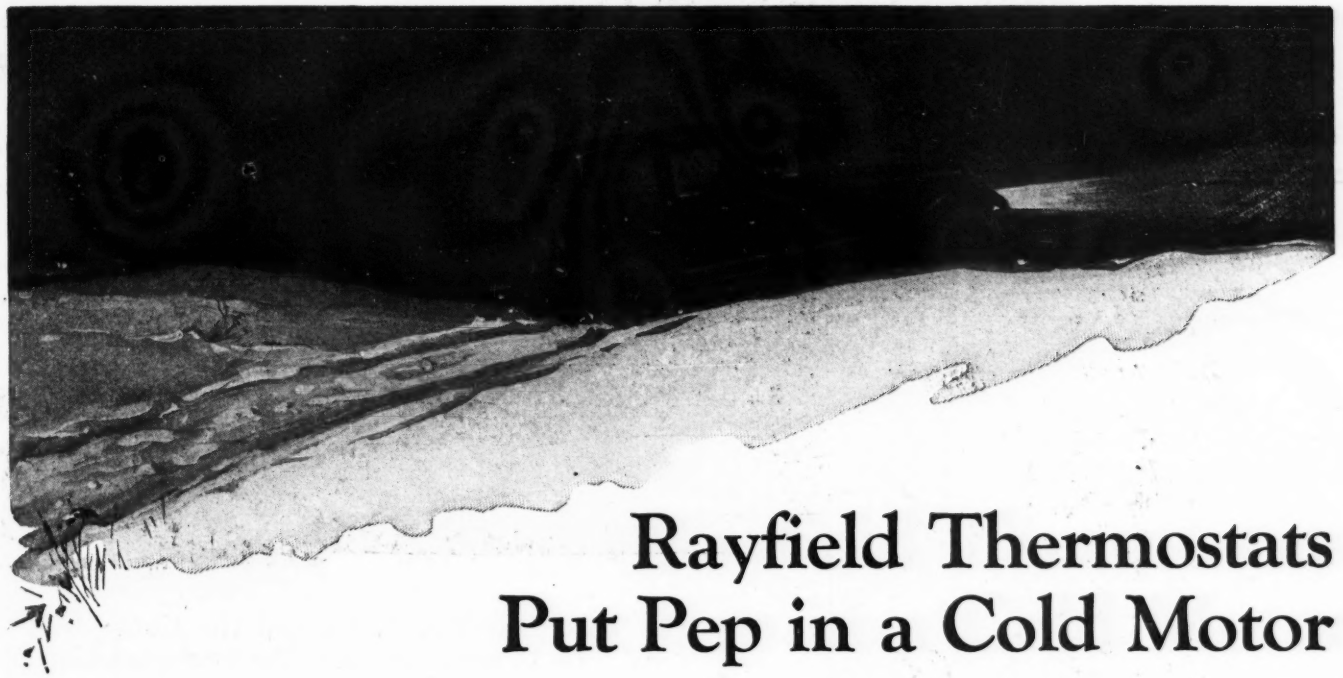
Here again Brunner engineers have designed a special type of controller to meet the most exacting requirements.

A Brunner controller will work on other Compressors - write for details, name your jobber.

BRUNNER MANUFACTURING COMPANY

MAIN OFFICE and FACTORY, UTICA, N. Y.

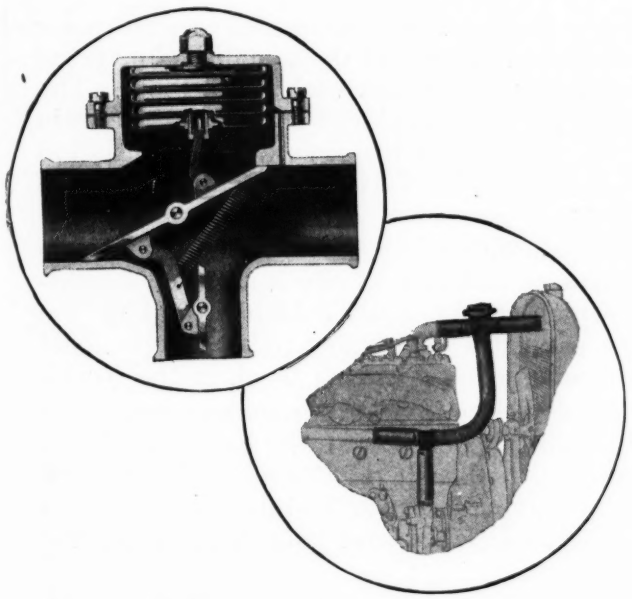
Branch Cincinnati. Ohio.



Rayfield Thermostats Put Pep in a Cold Motor

Your motor will "warm up" quickly in the coldest weather with a Rayfield Thermostat. It will stay warm longer when the car is standing. This insures easier starting.

In short, the Rayfield Thermostat will do away with many of the troubles encountered in winter driving.



The Rayfield Thermostat produces these results by controlling the circulation of water through the motor block.

It is easily installed at the top of the motor between the motor block and the radiator. When you start your engine the valve in the thermostat cuts off the circulation of the water from the radiator. In a minute or two the water in the motor block is warm and the engine is running smoothly. Then the valve opens gradually, letting in cold water from the radiator just as fast as it can be warmed to the proper temperature.

There is no hesitation or delay. The car runs smoothly from the first.

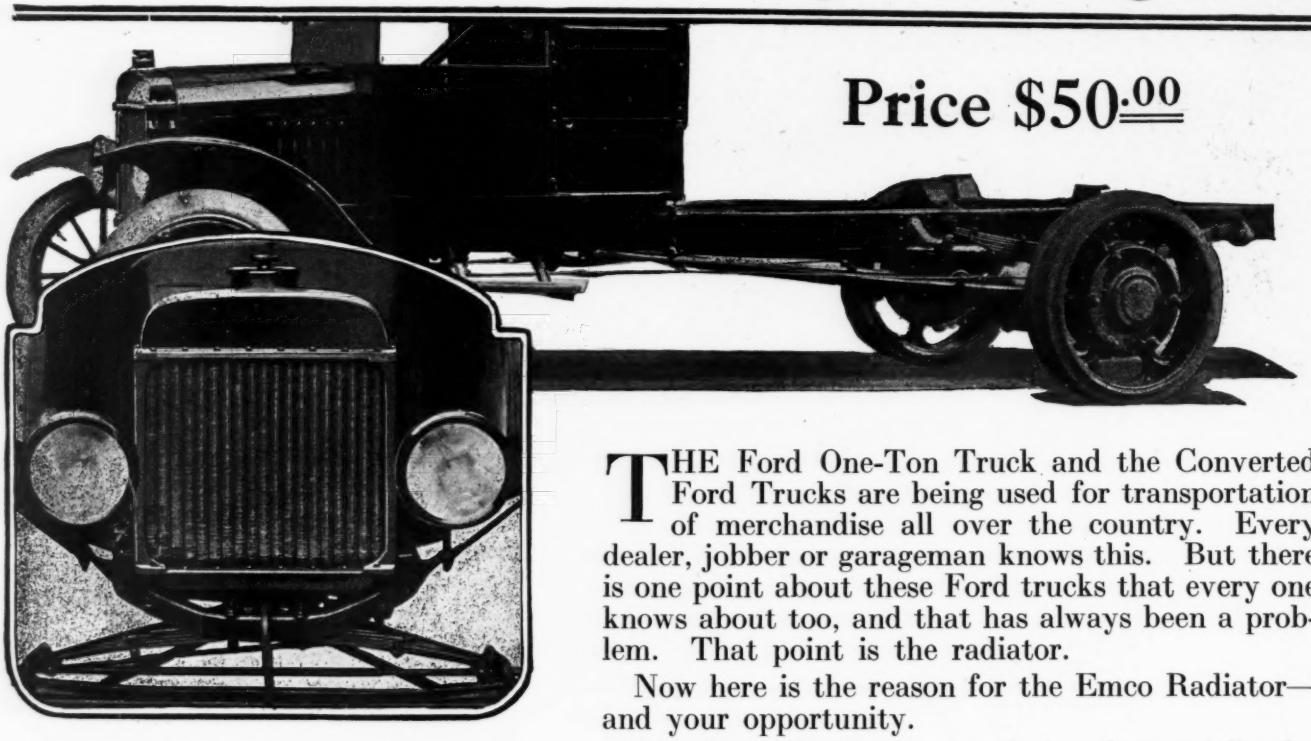
Rayfield motor thermostats may be obtained from the Rayfield Service Station in your city or from your dealer. If they do not have them in stock, write us direct.

BENEKE & KROPF MANUFACTURING CO.
21st and Rockwell Streets, Chicago, Illinois

11

RAYFIELD
MOTOR THERMOSTAT

Here Are Three Big Money-Mak



Price $50.00

THE Ford One-Ton Truck and the Converted Ford Trucks are being used for transportation of merchandise all over the country. Every dealer, jobber or garageman knows this. But there is one point about these Ford trucks that every one knows about too, and that has always been a problem. That point is the radiator.

Now here is the reason for the Emco Radiator—and your opportunity.

The Emco Radiator was designed especially for the Ford One-Ton Truck and the so-called Converted Ford Trucks (passenger cars with extensions). The strain of heavy loads and slower speeds puts a strain on the Ford motor that requires quicker radiation than the standard Ford Radiator can deliver in order to keep it cool.

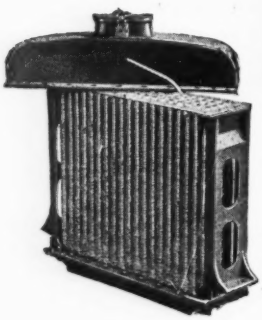
The Emco Radiator is a sturdy, well-made, correctly suspended radiator of the individual finned-tube type which can be easily attached, making the Ford Truck what it was intended to be, the cheapest and most economically-operated truck in the world.

Every live dealer, jobber or garageman can easily build up a profitable business on the Emco Radiator. It is not merely replacement business. Every new truck should have an Emco installed in order to obtain the best efficiency and longest life from the Ford truck.

Price $50.00. Attractive discounts. **Write now.**



Rear view of Emco Radiator. Note the strong compact construction, the large upper tank and big vents.



The Emco Radiator with upper tank detached. Individual tubes can be removed and replaced with blow torch. Since tubes can be replaced indefinitely, the indestructibility of the tanks and frame make the Emco practically everlasting.

EMCO Radiator
for FORD TRUCKS

MOTOR TRUCK RADIATOR
COLUMBUS CIRCLE

ers For Any Dealer or Jobber

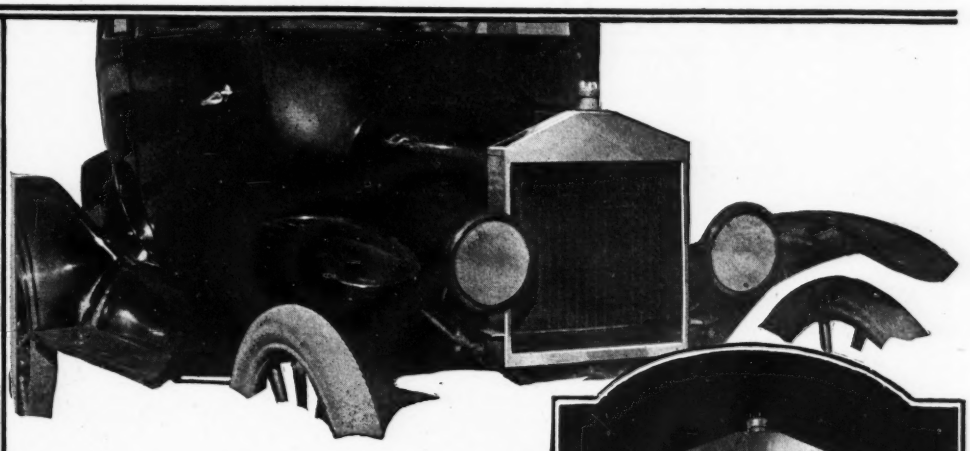


The Liberty Shell

for Ford Radiators

Here is something that will make a hit with every Ford owner you know. A chance to add to the appearance of a Ford—to give it the famous "Rolls-Royce look" now so popular with even the highest priced cars. And for $10.00! The Liberty Shell is a radiator shell made of Liberty silver (not nickel-plated)—and designed like our Doric Radiator along Rolls-Royce lines—which fits over the standard Ford Radiator core in place of the radiator shell furnished with the car. The change can easily be made by any mechanic.

We can make immediate deliveries in any quantities. Write today.



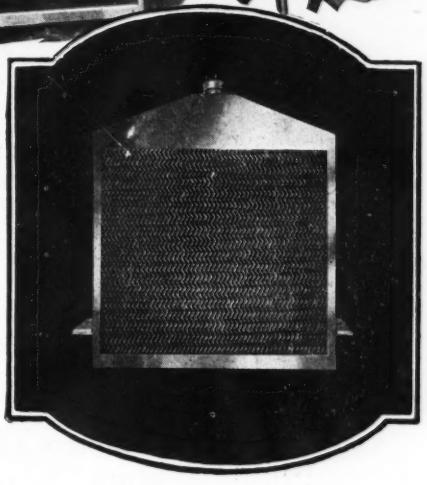
EVERY Ford Owner is interested in the appearance as well as the performance of his car. He knows he has the best value his money can buy. He is willing to spend a little more to add to its looks or its life.

With the new Doric Radiator of Liberty silver designed along the famous Rolls-Royce lines, he is doing both. The Doric Radiator is a well designed honeycomb cellular radiator with a cooling efficiency far beyond that of the ordinary Ford radiator.

As a radiator it will add greatly to the life of the Ford. As a part of the car it will add wonderfully to its appearance.

Every Ford owner becomes a live prospect because the double value of beauty and increased cooling efficiency looks mighty inexpensive at $40.00.

Write today for our liberal terms. This is a proposition you can't afford to overlook.



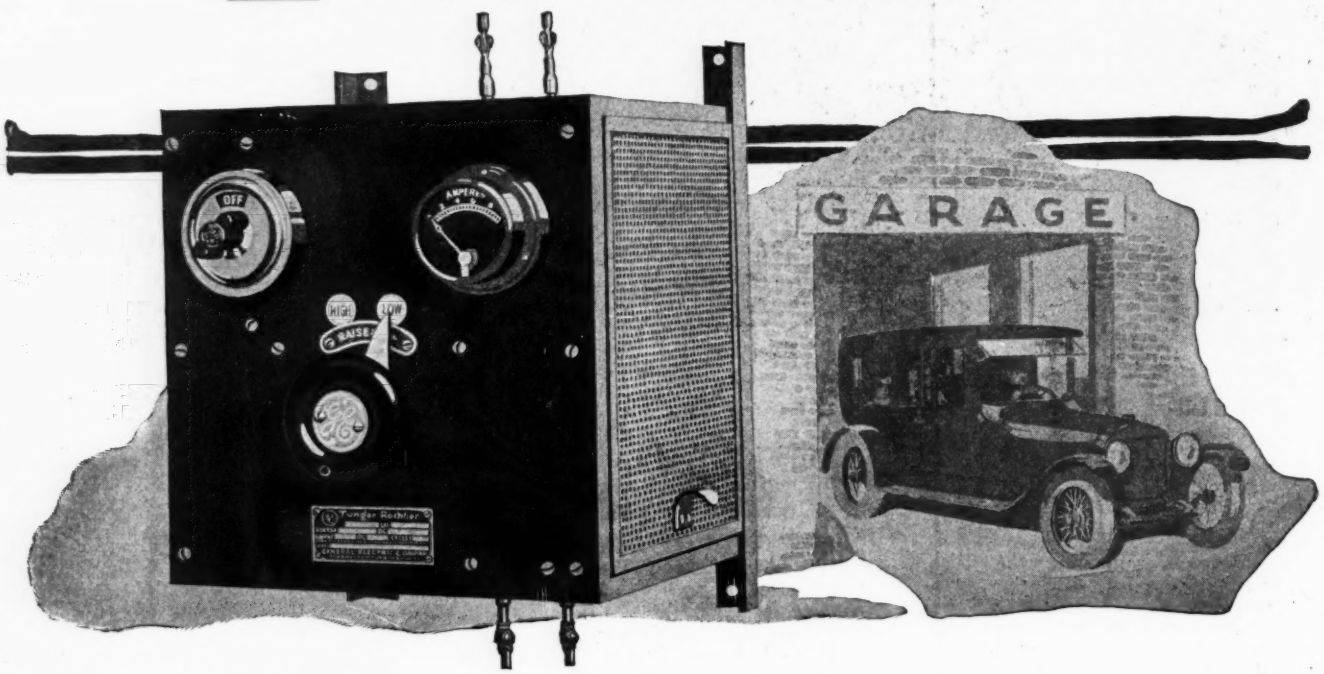
From every viewpoint the Doric is the best investment a Ford owner can make. Putting aside the satisfaction obtained from the improved appearance of the car, the increased efficiency and reduced repair bills secured by the Doric construction fully justifies its cost.

Price $40.00

DORIC Radiator for FORD CARS

& MANUFACTURING CO.
NEW YORK CITY

Batteries Need Special Care in Winter— Are You Prepared to Render this Service?



The **complete** garage must give 100% service. Battery charging, particularly in winter, is an important part of 100% service. Every garage, therefore, needs charging equipment—the right equipment will pay good profits.

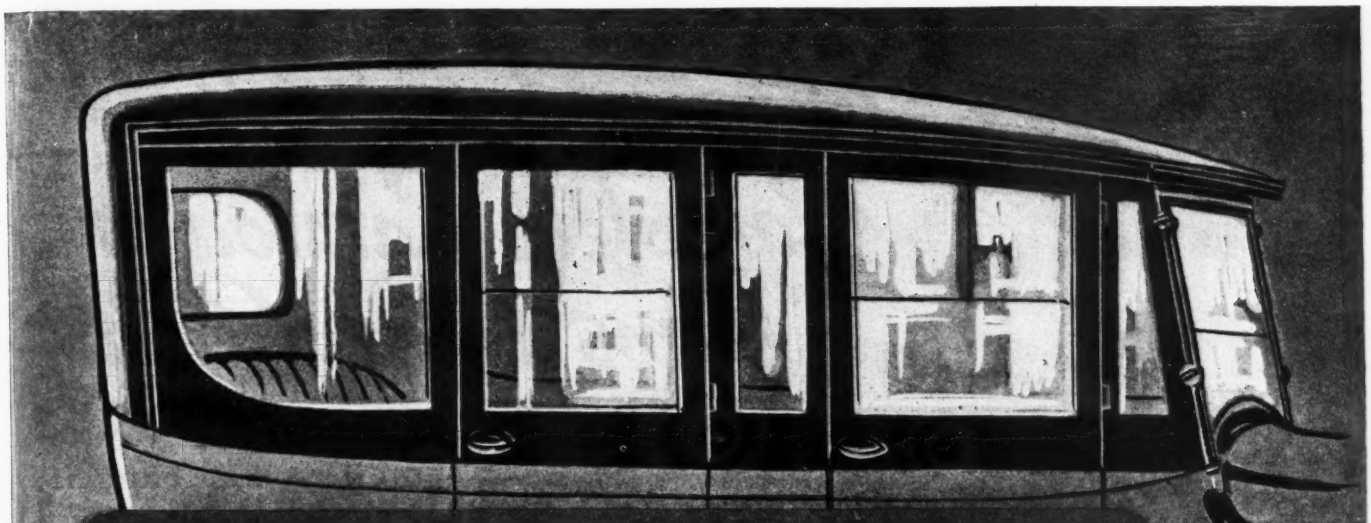
The Tungar Rectifier exactly fills this need for it is a **low cost** highly efficient battery charger. It is, in fact, the lowest priced reliable outfit of similar capacity and costs least to operate. It will charge from three to 30 cells of lead plate batteries at 6 or 7 amperes or less from **alternating current.**

Two particularly good features of the Tungar are that it connects to any alternating current lighting circuit and that it may be run without attendance as it is self-starting and protected against overloads or reversal of current.

Tungar has put the profit into battery charging
Your distributor can supply you promptly

General Electric Company
General Office Schenectady, N.Y.

35A-34



Anchor Top Dealers

Will Set New Sales Records this Year

THIS is going to be the biggest of all ANCHOR TOP years. Here is why:

Each year more motor car owners appreciate the comfort and convenience of closed car protection. Fewer are content to lay up their cars for many months each year because of inclement weather—when they need a car most. Or to accept the discomfort of gaping side curtains. Especially this year, after last year's Flu epidemic, will motorists be unwilling to risk this needless exposure.

All of which means a tremendous ready-made demand for ANCHOR TOPS.

Also, ANCHOR TOPS will be more heavily advertised than ever before. Full-page and half-page advertisements in all the leading national and farm publications are telling motorists of the comforts and beauty of these tops.

ANCHOR TOPS sell themselves. Comfortable, beautiful and practicable, they have an irresistible appeal to the open car owner. They are charming in outline, upholstered in handsome whipcord, and equipped with dome lights.

Specially designed for each specific car, these tops fit on the regular body irons without overhanging, squeaking or rattling. There are now 20 models of ANCHOR TOPS for these cars.

Limousine
Anchor Top
Landaulet
Glass-Enclosed

Buick, Ford, Willys-Knight, Overland, Essex, Dodge, Chevrolet

Get your share of this ready-made demand for these tops. Every open car in your community is an ANCHOR TOP prospect. Simply fill in the coupon and mail it to us. It will bring you photo prints, price lists and full details regarding our agency proposition.

Don't take the chance of being disappointed because you delayed. The only SURE way is to send in the coupon NOW.

THE ANCHOR TOP & BODY CO., 324 South St., Cincinnati, O

Fine Coach Builders for 30 Years



THE ANCHOR TOP & BODY CO.

324 South St., Cincinnati, O.

Without incurring obligation I would like to see photo prints and price lists for ANCHOR TOPS. Also full information regarding your agency proposition.

Name .....

Address .....

I sell the following makes of cars:

.....



Announcing the First Complete Catalog of Rims & Rim Parts

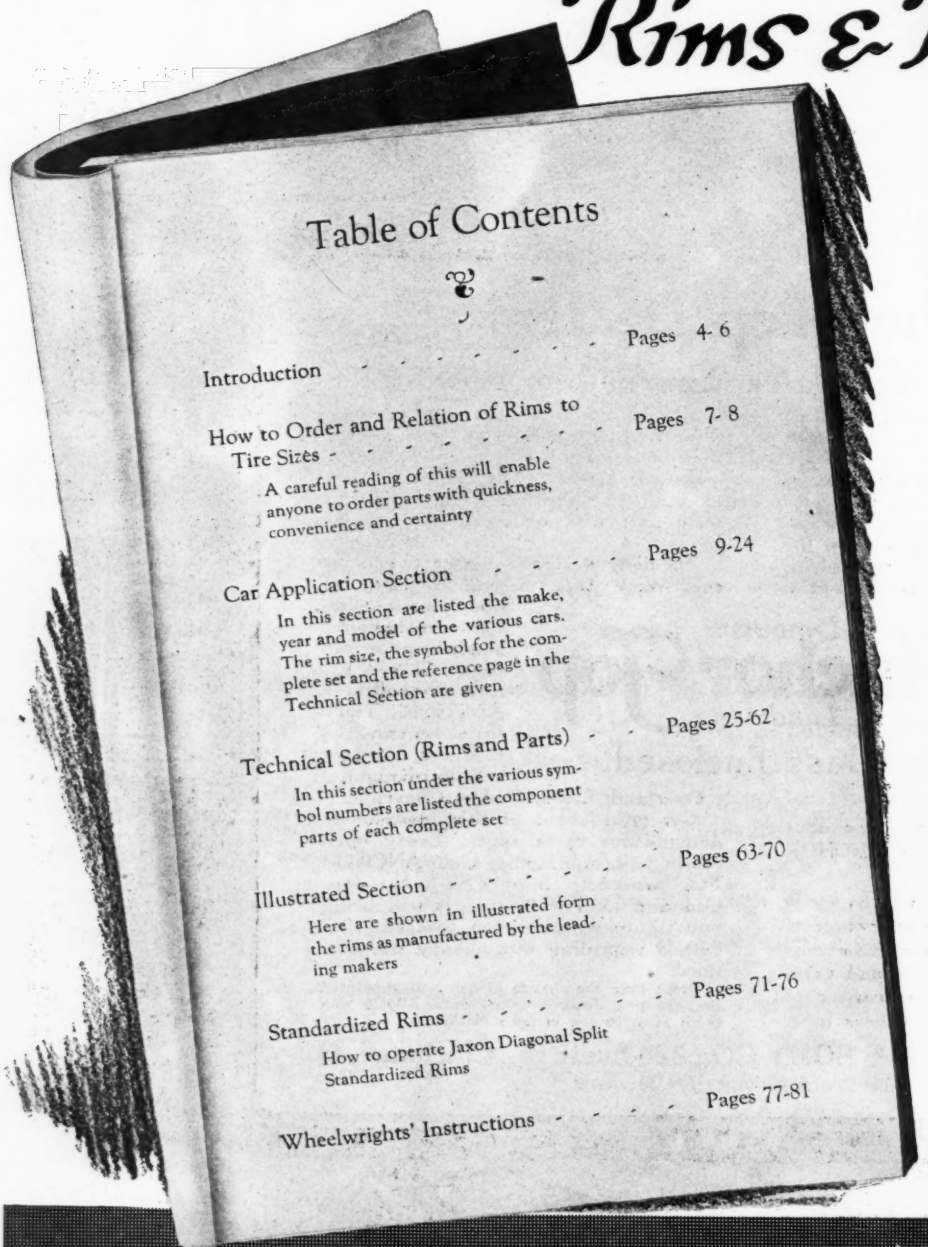


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How to Order and Relation of Rims to Tire Sizes - - - - - - - - Pages 7-8
A careful reading of this will enable anyone to order parts with quickness, convenience and certainty

Car Application Section - - - - - Pages 9-24
In this section are listed the make, year and model of the various cars. The rim size, the symbol for the complete set and the reference page in the Technical Section are given

Technical Section (Rims and Parts) - - Pages 25-62
In this section under the various symbol numbers are listed the component parts of each complete set

Illustrated Section - - - - - - Pages 63-70
Here are shown in illustrated form the rims as manufactured by the leading makers

Standardized Rims - - - - - - - Pages 71-76
How to operate Jaxon Diagonal Split Standardized Rims

Wheelwrights' Instructions - - - - - Pages 77-81

We shall be glad to mail you a copy if requested on your letter head. Write the Branch nearest you.

Branches in the Following Cities

ATLANTA
12-14 W. Harris St.
BOSTON
19-23 Jersey St.
BUFFALO
1127-33 Main St.
CHICAGO
2715-17 Michigan Ave.
CLEVELAND
1973 East 61st St.
DENVER
1332-38 Acoma St.
DETROIT
78-83 W. Willis Ave.
INDIANAPOLIS
1133 N. Meridian St.
KANSAS CITY
1416 McGee St.
LOS ANGELES
1152 S. Grand Ave.
MINNEAPOLIS
10-12-14 S. 10th St.
NEW YORK
239-241 W. 56th St.
OMAHA
1806 Harney St.
PHILADELPHIA
242-248 N. Broad St.
SAN FRANCISCO
Van Ness at Clay
SEATTLE
1708-10 Broadway
TORONTO
88 Adelaide St., West

MOTORS SERVICE

UNITED MOTORS SERVICE INCORPORATED

GENERAL OFFICES, DETROIT, MICH.

SERVICE DEPARTMENT OF Delco-KLAXON-REMY

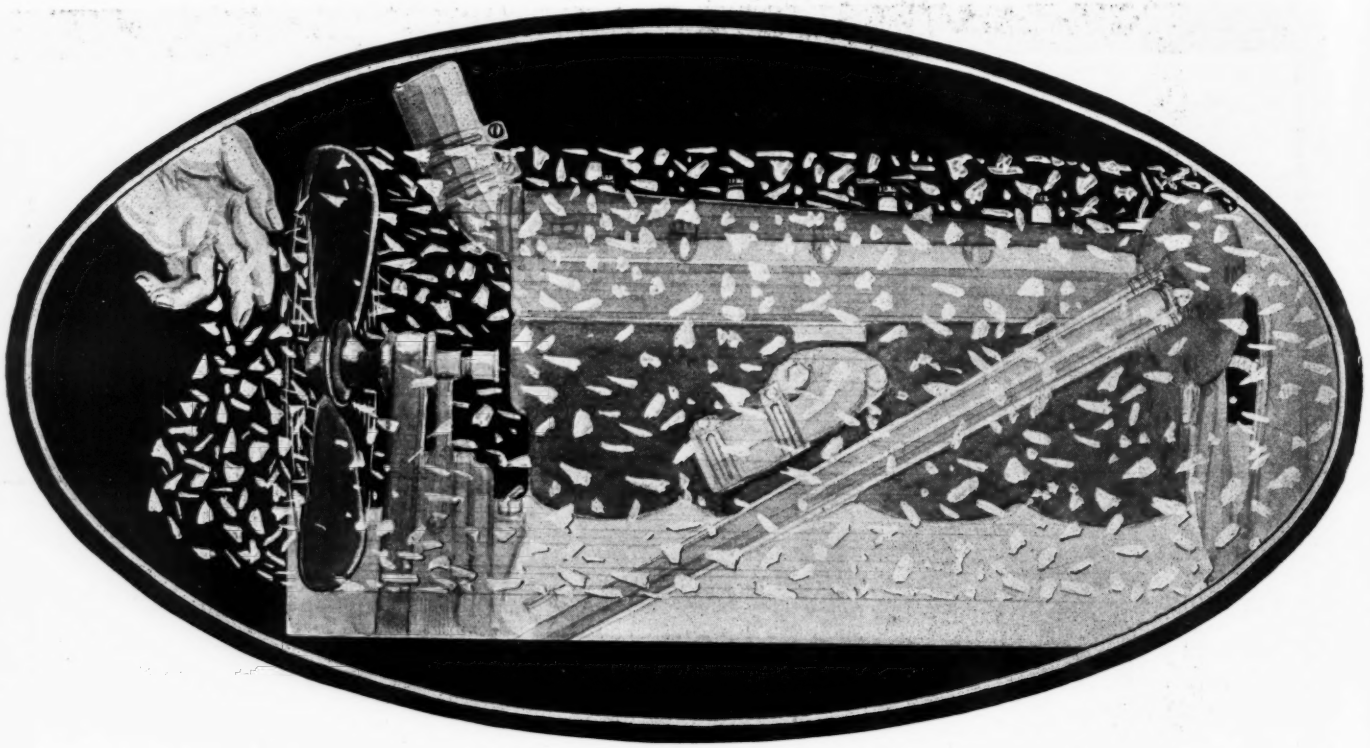
MOON

The VICTORY MODEL



This five-passenger Six might easily be called the "Winged Victory" model—as its extreme lightness of construction has been achieved in combination with the power and beauty which is essential to successful Motor Car Design.

MOON MOTOR CAR COMPANY ST. LOUIS, U. S. A.



The Juelson Two-Bladed Fan Drives ALL of the air currents over ALL of the surfaces of the cylinders. A shaft of swiftly moving air just wide enough to bathe the engine, keeping the water cool under all climatic conditions.

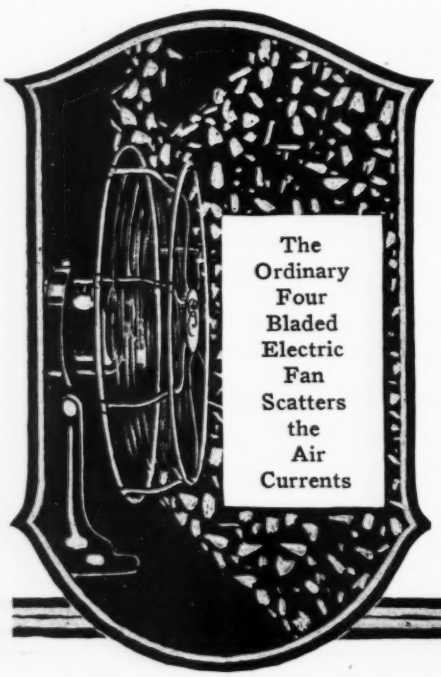
By means of the Juleson Spoon-Shaped Blades, the air currents are controlled and intensified, whereas with the old style fan, most of the air currents slip off the tips of the blades and are scattered—wasted.

DEALERS—Show your customers the JUELSON Two-Bladed Fan. Recommend it for replacements—for smoother running motors at correct temperatures.

JOBBERS—It will pay you to know more about the Juleson principle. Send for complete details today.

RETAIL PRICE, $1.20.

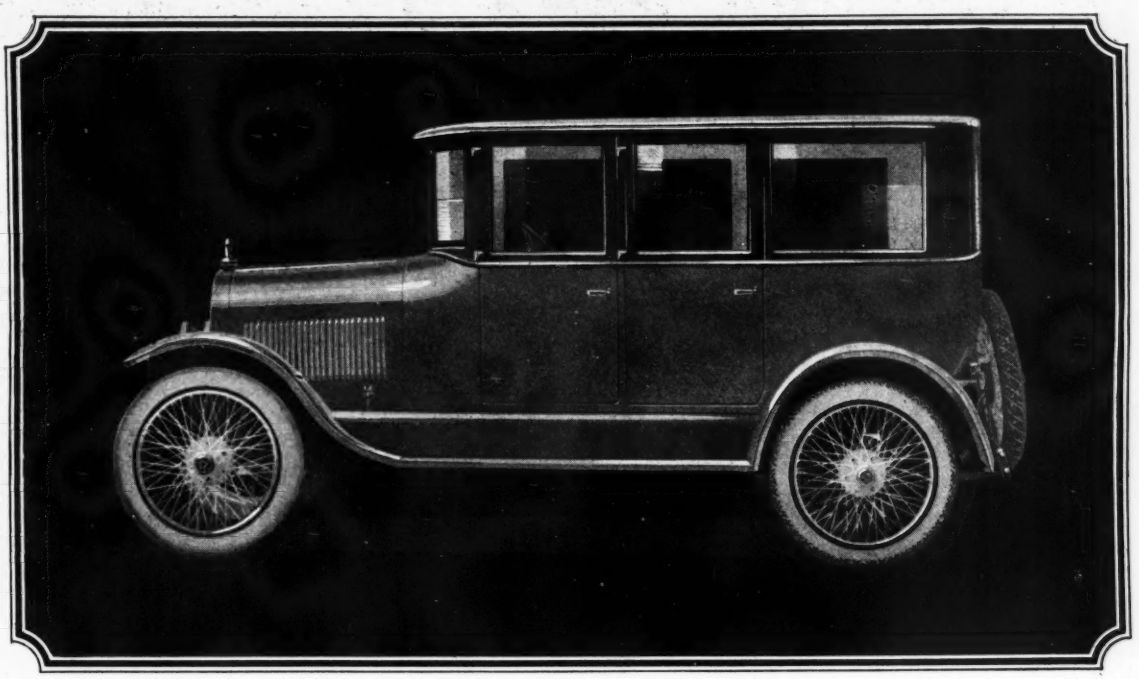
Juelson Fans for Ford Cars Are Now Available Through Jobbers



American Aero Company
GENERAL OFFICES
PEOPLES GAS BLDG.
CHICAGO, ILL.

SALES DEPARTMENT
J. WADSWORTH STAFF
122 South Michigan Boulevard, Chicago

New York Atlanta San Francisco Dallas Toronto Winnipeg Vancouver



In Appointments

There is a rare good taste reflected in the appointments of the new Crow-Elkhart Sedan—a thoughtful care in their selection. The Window-curtains are of richly-corded silk, the carpeting soft-textured and all of wool, the upholstery of heavy whipcord. The fittings are of nickel, and very complete—even to a chic vanity case and convenient smoking set. The appointments of the Crow-Elkhart Sedan as well as the construction and design bespeak its custom finish.

Representatives demonstrating the Crow-Elkhart Sedan find that the richness of appointment appeals to prospective purchasers as much as the unfailing performance and smart design.

CROW-ELKHART Multi-Powered

Model H-57—Seven pass. Sedan, six cyl.	$2395
Model H-56—Five pass. Touring Car, six cyl.	1545
Model L-55—Five pass. Touring Car, four cyl.	1295

WRITE FOR CATALOG CONTAINING FULL INFORMATION.

CROW-ELKHART MOTOR CORPORATION, Dept. 101, ELKHART, INDIANA
Export Department, Broadway and Fifty-third Street, New York City, U. S. A.

Dealers will instantly recognize the unusual profit-proposition that the representation of the Crow-Elkhart Multi-Powered line affords. There are a limited number of desirable territories still available. Write today, or wire for particulars of our attractive dealer franchise.

The WEAVER Auto Ambulance



Towing Through Congested Traffic

—say Forty-Second Street and Fifth Avenue in New York—State and Madison in Chicago—or through the most congested spot in your town is a dangerous matter with ordinary towing facilities. But when you tow through these places with the **Weaver Auto Ambulance** doing the work—you do so with a sense of security—with a knowledge that you control the car you are towing as firmly as the one you are driving.

The car you are towing is disabled, has a broken wheel—perhaps two broken wheels. The constant stop and start of the congested traffic zones may cause the disabled car to "jam" you if you follow ordinary towing practices. The **Weaver Automobile Ambulance,** however, does away with that danger because of its rigid steel tongue.

The WEAVER AUTO AMBULANCE can be set firmly under axle of the disabled car and can be adjusted so as to allow the disabled car to ride as level as if on four wheels. Simply jack up the disabled car to level, set the standard of the Auto Ambulance under the axle of disabled car and adjust to necessary height. Remove the jack and the AMBULANCE takes the place of the broken wheel. See how easy?

Then attach the rigid steel telescoping tongue of the Weaver Auto Ambulance to your car and drive to the garage. The distance between your car and the disabled car is always the same—whether rambling along quickly or creeping through congested traffic—whether going up hill or down grade. You know the disabled car cannot "jam" you, for the rigid steel telescoping tongue is on the job. It adjusts every 2½ inches from 6½ to 12 feet.

The Weaver Auto Ambulance has broad, flat, cast steel wheels, and you know this insures the smooth riding of the disabled car. Even over rough roads the substantial wheels grip firmly. Roller Bearings are another feature of the Weaver Auto Ambulance. Their efficiency is obvious.

Your towing can be done in a most efficient and economical manner if you use the Weaver Auto Ambulance—described in detail in our catalog. May we send you a copy of it? You will find it interesting for it also describes the many WEAVER GARAGE APPLIANCES.

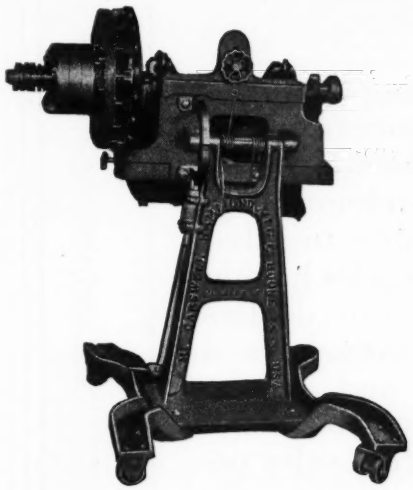


Weaver Manufacturing Company
2165-79 S. Ninth St., SPRINGFIELD, ILLS.

BETTER EQUIPMENT MEANS BETTER PROFITS

Put Your Shop On A Better Paying Basis With

CARSWELL-HAMMOND GARAGE EQUIPMENT



Bench Stand for Ford Motors

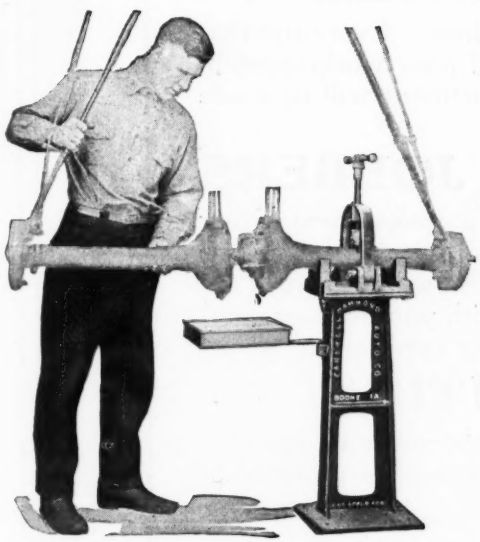
Three working positions of the motor are possible with this stand, making it convenient for the workman to do various jobs. The mechanic can reseat and regrind the valves, put in pistons, tighten connecting rods, fit main bearings, attach the transmission to the motor and do any other required jobs on the motor in the quickest possible time. In working on the motor the transmission may be taken off or left on as the workman wishes. This stand will cut down the time on every Ford motor overhauling job in your shop. The time it saves not only enables the stand to pay for itself but soon makes it an additional profit maker. Shipping weight, 170 lbs.; with portable base, 260 lbs.



Bench Stand for Fordson Motors

Operates in the same way as our stand for Ford motors. Built of heavy material throughout. Saves 30% of time and labor in overhauling the motor. Shipping weight 325 lbs.

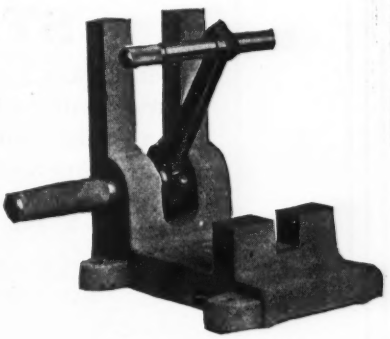
Rear Axle Vise Stand



By using this stand the repairman can do all the work on a rear axle up off the floor with such ease and quickness that he will save about one-half the usual time on the job. This stand holds the axle housing firmly in replacing the spring perch bushings, replacing brake shoes, brake cam bushings, brake rod guides, radius rods, reaming the bushings, replacing the roller bearing sleeves, etc. Shipping weight, 140 lbs.

Write for Detailed Information

Your shop will be better equipped for efficient and economical work if your workmen have Carswell-Hammond Garage Equipment on hand. Complete information and prices will be sent upon request. Jobbers wanted.



Connecting Rod Alignment Machine

As a bent connecting rod will cause a slap in the motor every rod should be tested before being replaced in the motor. Every overhauling job will be far more satisfactory if this is done. This machine enables you to make sure that every connecting rod is perfect. Shipping weight 40 lbs.

CARSWELL-HAMMOND MFG. CO.

BOONE, IOWA

"Do Better Work in Less Time"

EXCLUSIVE TERRITORY



NOW BEING ALLOTTED ON

HENDERSON TIRES

Henderson Tires present an unusually good money making proposition to progressive, reliable dealers. We want dealers who realize the tremendous possibilities in a well made, quality tire that sells at a medium price. Besides having exclusive territory, Henderson dealers know that back of them they have a quality tire, fair prices, and honest methods. These we believe to be the best combination for a perfect sales organization.

STANDARD GUARANTEE

Henderson Tires are everything that we claim for them. Every tire that leaves our factory is guaranteed against defects and poor workmanship. If any tire fails to give satisfactory service, an adjustment will be made in keeping with common practice.

PRIVATE BRANDS FOR JOBBERS

Private brands for jobbers are our specialty. We make them either from your own moulds, or from moulds that we produce especially for jobbers. Our complete equipment guarantees jobbers quick work on special brand tires on short notice. Let us figure with you on your coming needs. We will furnish sample and prices upon application.

GET OUR PROPOSITION

The Henderson Tire is an easy seller. Henderson customers are life customers. Complete details of our proposition will be sent any jobber or dealer on request.

HENDERSON TIRE & RUBBER CO.
BUCYRUS, OHIO

The Bowser Equipped Station Gets the Profitable Business

Bowser Pumps extend a forceful invitation to motorists to stop and get pure, filtered gasoline and clean lubricating oil, accurately measured.

The handsome appearance of Bowser Pumps, their mechanical conveniences enables dealers to serve the public quickly, accurately and with safety.

They bring a volume of business that earns thousands of dollars in profits for dealers.

Bowser Pumps are mechanical salesmen. They open the door-way to bigger business and profits.

Illustrated literature sent promptly on request

S. F. BOWSER & COMPANY, Inc.
Fort Wayne, Indiana
U. S. A.

Branch Offices in 21 Cities of the U. S.
Canadian Office and Factory, Toronto, Ont.

London
32 Victoria St. S. W. 1

Paris
5 Rue Denis-Poisson

Havana
Lonja del Comercio 427

Sydney
6 Castlereagh St.

BOWSER
ESTABLISHED 1885
CURB PUMPS
for Gasoline, Oil *and* Kerosene



VESTA
STORAGE BATTERY
"Costs less per Month of Service"



Motorists Know the Vesta Sign Means Complete Battery Service

BATTERY users throughout the country have learned to know and appreciate the equipment at all Vesta Service Stations. They have learned also that prompt, efficient and courteous service is always to be found under the Vesta sign. Word-of-mouth advertising from motorist to motorist constantly spreads this Vesta good-will.

This is one reason why Vesta dealerships are so profitable.

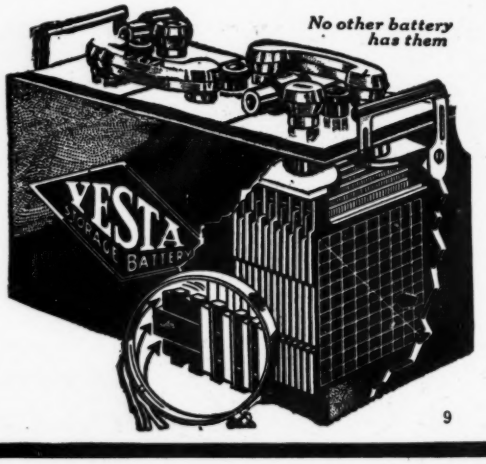
Another is the quality of Vesta batteries themselves. The four patented features found only in these batteries insure longer battery life. Motorists demand these features, and only Vesta Service Stations can supply them.

In certain localities there are still a few openings in our organization. We will welcome to the "Vesta family" responsible dealers who are prepared to live up to the high standards of Vesta Service.

Reasons for Vesta Satisfaction

1. ***Vesta Indestructible Isolators*** — an ingenious device locking the plates apart and preventing short circuits.
2. ***Vesta Impregnated Wooden Mats***— preventing "treeing" and its disastrous consequences.
3. ***Titanium*** — a rare mineral entering into the lead plates, hardening them and giving them longer life in use. It precipitates minerals and impurities in solution, thus increasing the efficiency of the battery.
4. ***The Vesta Poro-Hard Plate***—a plate which is hard and extra durable, but because of its exceptional porosity, gives unusual capacity.

No other battery has them

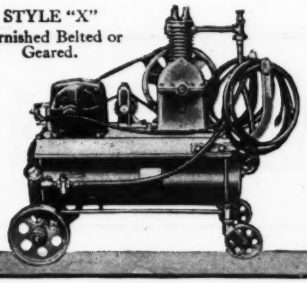


Vesta Accumulator Co.

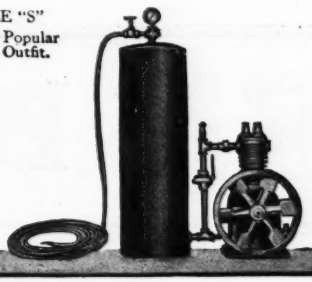
2100 Indiana Avenue Chicago, Illinois

9

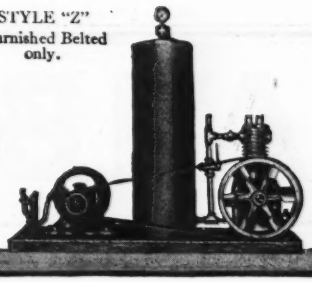
STYLE "X"
Furnished Belted or Geared.



STYLE "S"
Simple, Popular Belted Outfit.



STYLE "Z"
Furnished Belted only.



The Curtis Sign is 10 x 14 inches—baked enamel on steel. It is furnished FREE with every Curtis Garage Air Compressor and cannot be obtained in any other way.

FREE
CURTIS AIR
FREE FROM OIL

Conserve Your Patrons' Tires

Motorists will go a long ways to find the Curtis Sign and get Curtis Air—FREE FROM OIL—because it means less blowouts and greater tire mileage.



CURTIS Air
— Free From Oil

Because of correct design and good construction, Curtis Garage Air Compressors are dependable and operate with minimum power. The patented and exclusive self-regulating splash oiling system prevents oil from getting into the air line. The air is pure, clean, safe and FREE FROM OIL.

OTHER CURTIS FEATURES

Fan flywheel cools cylinder. Valves of light weight and large area. Hand unloader permits starting against full tank pressure without injury. Large drop-forged crank shaft. Adjustable, renewable, die-cast, non-cutting bearings. Head removable without breaking pipe connections—only one gasket.

MADE IN VARIOUS SIZES

Curtis Compressors are made in various styles and sizes to suit your special needs. Write today for illustrated literature giving full particulars. Use the coupon.

CURTIS PNEUMATIC MACHINERY CO.
1527 Kienlen Ave., St. Louis, U. S. A.

Branch Office:
530-H Hudson Terminal, New York City.

Curtis Pneumatic Machinery Co.
1527 Kienlen Ave.
St. Louis, Mo.

Gentlemen:
Please send me full details on Curtis Air Compressors—your proposition and prices.

Firm Name.....

Address.....

Jobber's Name.....

Address.....

AUBURN Beauty-SIX

The inclosed models of the AUBURN Beauty-SIX are characterized by the same verve and grace of line which won such marked favor for the Beauty-SIX touring models. Here again, you find daring mellowed by experience, conscious artistry tempered by discretion. Here again, you find ample room for luxurious comfort rather than mere riding space. In elegance of appointments and fittings these new AUBURN Beauty-SIX models eminently satisfy the most discriminating.

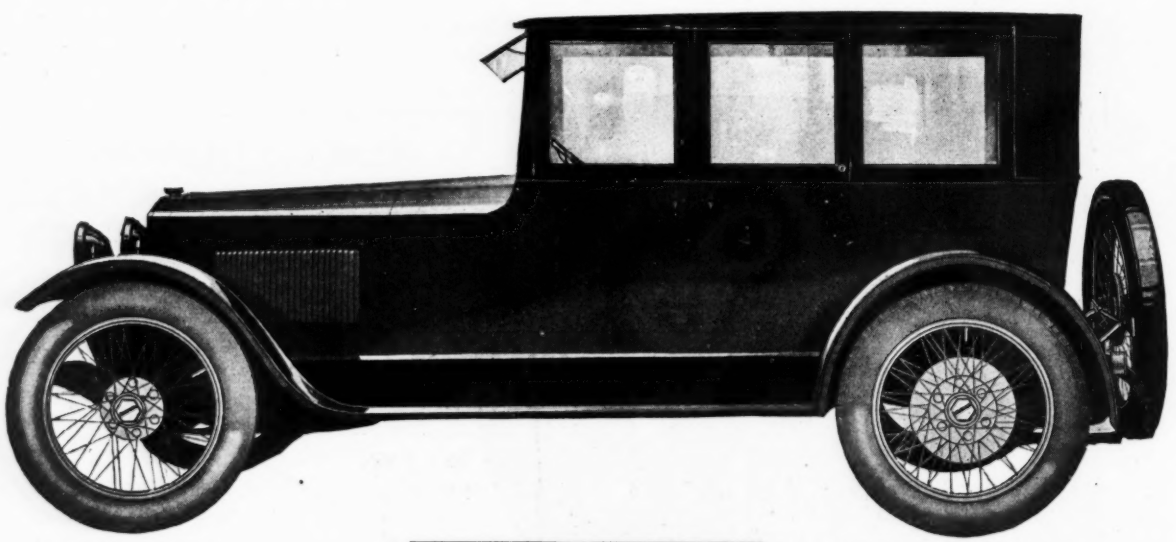
Auburn Model 6-39-H Touring	$1,695
Auburn Model 6-39-K Tourster	1,695
Auburn Model 6-39-R Roadster	1,695
Auburn Model 6-39-Sedan, 5-Passenger	2,475
Auburn Model 6-39-Coupe, 4-Passenger	2,475

Auburn inclosed models for Fall and Winter are now being exhibited by Auburn representatives

AUBURN AUTOMOBILE COMPANY,
Auburn, Indiana

Automobile Engineers for Twenty Years

Vote for Good Roads. Give the Nation a Second Line of Transportation



AUBURN Beauty-SIX



COE-STAPLEY

Peteler AUTO JACK

DESIGN FEATURES

A telescope handle that makes it unnecessary to crawl under the car.

A short stroke. No overhang of the car can interfere with the action.

The quickest stroke known in jack design (⅜ inch to each stroke).

A jack weighing 8½ pounds with a lifting capacity of 3,000 pounds—*½ ton over capacity.*

Dealers—

When selling the Peteler Jack, Point Out This Lifting Bar Feature

Here is a small design item but a highly important one. Note that the head of the bar is slightly concave. This seats the axle securely. It cannot slip off, and if not correctly seated, it will adjust itself.

The Peteler Jack is the best seller in its field—simply because it is the best jack.

You show a car owner that he can raise and lower the car—and then remove the jack without releasing the handle. *He will buy on that feature alone.*

Now add to your demonstration talk, the items of design and construction noted on the left.

This Peteler Jack Sells for $8.50

There isn't a dealer reading this, who will fail to see the tremendous sales possibility among car owners in his territory.

MANY UNFORCED SALES—GENEROUS PROFITS. WRITE FOR THE BIG STORY

COE-STAPLEY MANUFACTURING CORPORATION
Factories, Bridgeport, Conn.
Sales Offices 136 Liberty Street, New York

DEALERS

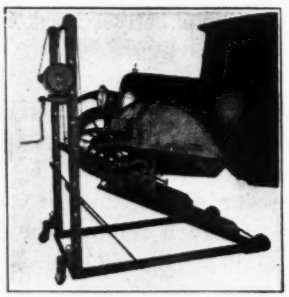
If *your* Jobber, Perchance, cannot give you the Details we will Furnish Them.

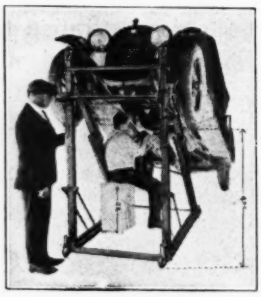


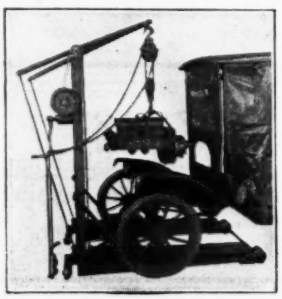
Price $175.00

KLEMME

ONE MAN
AUTO HOIST AND CRANE







WITH this simple, strong device one man can lift either end of a motor car or truck to a sufficient height to permit him to work underneath the motor sitting in a comfortable position and with plenty of light on the job. With this hoist in your garage you will not only be saved approximately 50% of your labor costs, but you will be able to render quicker and better repair service to your customers.

The Klemme Auto Hoist lifts from underneath the axle, which is the only safe means of lifting a motor car. It is tested to a strain of 13,000 pounds and guaranteed to lift any size or weight of motor car. There are no chains or pulleys—nothing to mar body finish or any part of the car and it is absolutely safe, being provided with a safety locking device which locks it at any desired height.

The portable feature of the Klemme One Man Hoist and Crane is an important one. It can be moved with ease from one part of the garage to the other or into the street if necessary. One man can handle it with ease.

The crane attachment is used to lift out motors, transmissions, etc. It takes the place of an overhead track as it is an easy matter to move it to any part of the garage or shop with or without the motor hanging on it. This attachment is included in the outfit and may be attached or detached in a few seconds. The crane attachment alone is worth the price of the outfit.

Manufactured by KLEMME MFG. CO.

Sales Department:

THE BAILEY-DRAKE COMPANY, *Inc.*

1120 S. Michigan Ave., Chicago, Ill.



Winter Sales and Profits

Regardless of season or weather—the demand for the SHALER 5-Minute Vulcanizer continues.

In severe weather the motorist must insure himself against trouble and delays—and keep prepared at all times for emergency tire repairs.

That is why the repeat-sale profits of the SHALER Patch-and-Heat Units are still coming in fast right now, when other sales are dropping off—and they continue throughout the year.

Millions of SHALER 5-Minute Vulcanizers are now in use. Every one of these motorists needs the SHALER Patch-and-Heat Units right along to use with their vulcanizers.

This tremendous repeat business—repeat profits—comes to the dealers regularly all year long—without effort.

SHALER 5-Minute Vulcanizers are easy to sell. Every sale is only the beginning of a chain of repeat sales for SHALER Patch-and-Heat Units to be used with this vulcanizer.

Your Jobber Sells SHALER Vulcanizers

Place your order with him at once for your winter needs and keep your winter profits up to your summer level. Write us for catalog of the complete line of SHALER Vulcanizers for garages, repair shops and motorists' use.

C. A. Shaler Company, 247 Fourth St., Waupun, Wis.

SHALER

5 Minute Vulcanizer

Here's How to Put a Crimp in the Cost of Crankshaft Grinding!

It's often less expensive to junk a crankshaft than to send it to a machine shop.

It's always less expensive to true up a crankshaft with an Atlas Abrasive Tool than to scrap it.

If for no other reason than to avoid the impossible task of scraping bearings to flat crank pins, money spent for an Atlas is a profitable investment.

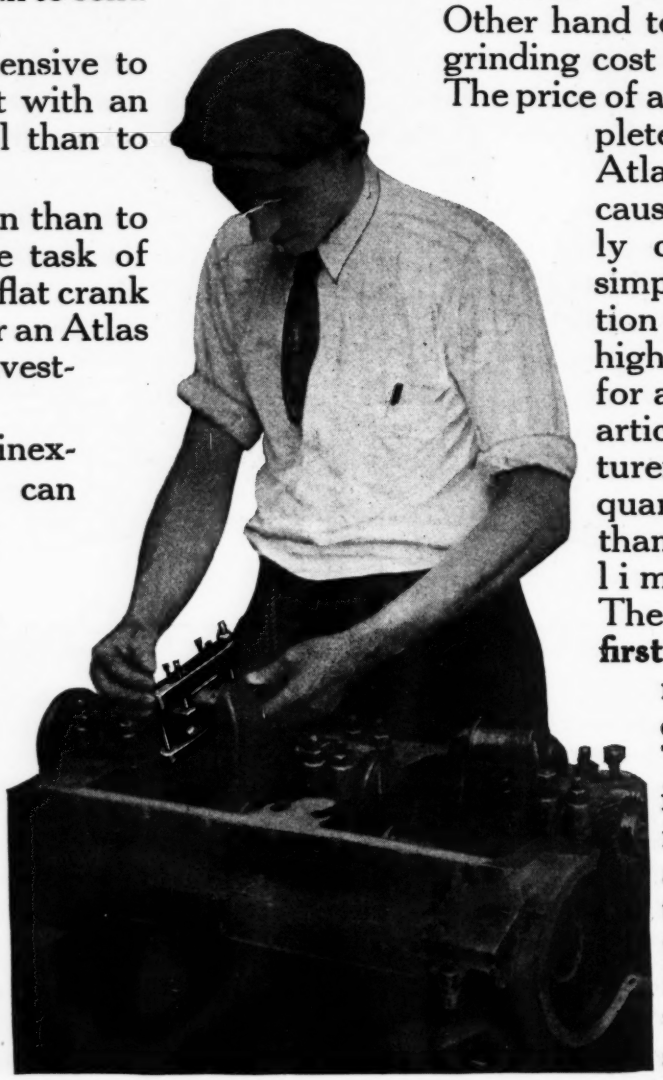
With an Atlas any inexperienced operator can do accurate work to within one thousandth of an inch. This is better than any machine shop guarantees with the use of a lathe.

No other equipment is necessary. Use a vise to hold the crankshaft, or, for quicker results, simply drop the bottom of the crank case and operate the Atlas on the shaft without removing it from the car. No other hand tool for crankshaft grinding is so convenient as an Atlas. The Atlas trues up any crankshaft within an hour's time. No days or weeks of delay.

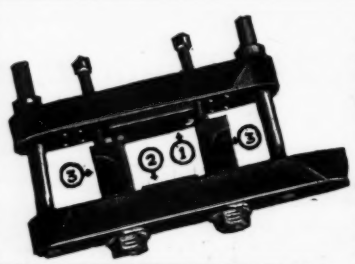
Other hand tools for crankshaft grinding cost from $50 to $100. The price of an Atlas is $10 complete, postpaid. The Atlas is low-priced because of its scientifically correct one cutter simplicity; the elimination of the customary high profits demanded for a new and patented article and a manufacturer's confidence that quantity sales will more than offset high priced limited production. The profits from your **first** use of an Atlas will more than pay its cost.

The Atlas is made in one size only, for it is adjustable to fit any crankshaft up to 2½ inches diameter.

Extra cutters, with which are packed a set of two bronze track bearings, cost 30c each, postpaid. Each cutter will true up from 10 to 20 pins, according to condition. Full directions for use accompany each Atlas Abrasive Tool.



Above: The HOW; Below: The WHY of Quick, Easy and Profitable Crankshaft Grinding.



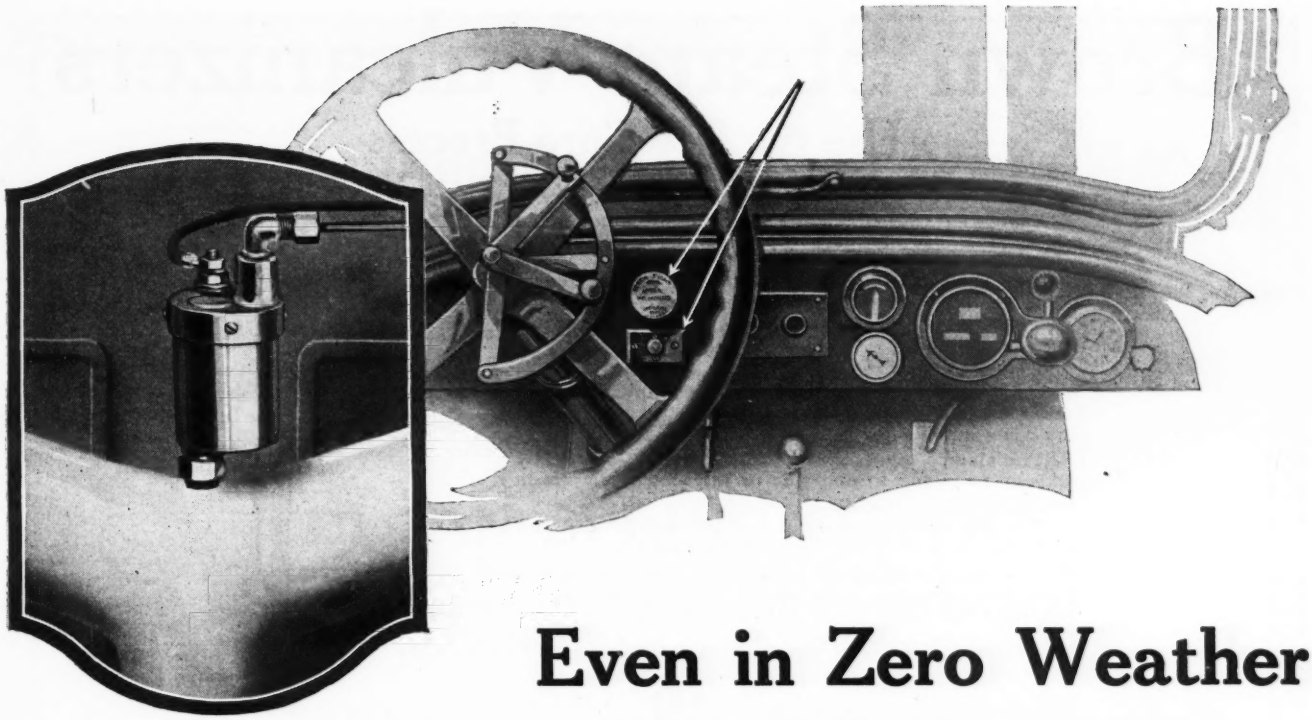
1. *Hardened and tempered steel cutter. Cuts in one direction only.*

2. *Bronze track bearing. Cannot cut ring in pin like hard steel nor freeze against pin from friction like soft steel.*

3. *Adjustable Abutment Blocks, which slip easily up against the face of the crank pin and hold the cutter and track in proper working place.*

Wire Your Order Today *Money Back Guarantee*

ATLAS MFG. CO., North Canal St., Pittsburgh, Pa.



Even in Zero Weather

This Electro Gas Primer Will Start the Engine with a Momentary Spin of the Starter, or a Couple of Turns of the Crank. Intense Electric Heat Turns the Poorest Fuel Into Superheated Vapor

TO THE TRADE

Before you read this, get the idea out of your head that this is one of the ordinary and inefficient Primers which it may have been your lot to sell to customers who afterward returned dissatisfied

The basic principle of this Primer is different. It is a super-heated vaporizer. It is radically right and cannot fail. Withal, its simplicity and sturdiness are marked, and once installed it becomes a necessary—almost integral—part of the car.

The illustration shows the application. In a very few seconds the owner converts ice-cold gasoline from the lead up to a temperature of 630 degrees. This is accomplished by two simple operations from the dash board—one by throwing the switch, which heats the resistance coil to a tremendous temperature; the other, a pull of the plunger which throws the charge at a temperature of 630 degrees F. into the manifold intake.
We offer it as the last word in easy engine starting. From the standpoint alone of battery saving, it is an important economic factor. The Primer uses say 18 amperes at the beginning and as the unit heats this amperage drops to 7.

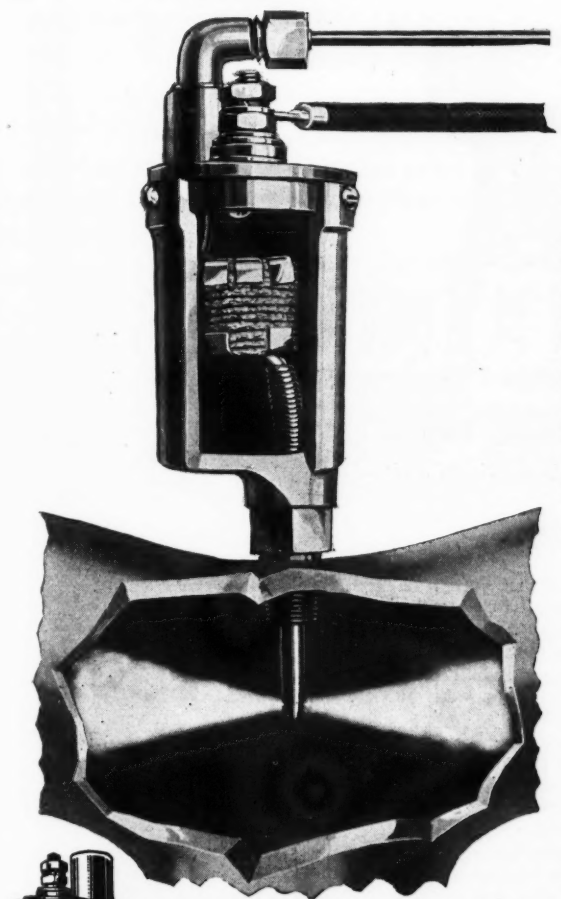
Now consider this. It requires 150 amperes to turn the motor in cold weather. The starter must spin at the expense of the battery. With the superheated gas introduced into coldest engine, to start is but a matter of a few seconds. It is safe—the gasoline is not exposed to the atmosphere. No open contact at heating unit.

This is the story in brief. We have an interesting proposition to make you involving the installation of a demonstrating counter stand in which your prospective buyer can see for himself, through the cutaway in the manifold, the operation of this wonderful device. Write and let us give you full details.

The Auto Distributing Co.

Plainfield **New Jersey**

New York Office: 1834 Broadway





Brown Steam Vulcanizers

Use the Dry Cure Process

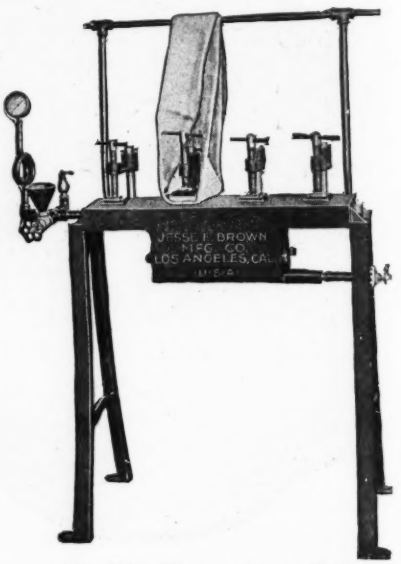
BACKED by years of experience in tire building and repairing, this make of vulcanizers was designed and built to most efficiently do the work of tube vulcanizing and tire retreading. The result has been a complete line of Vulcanizers and Retreaders that have successfully met the demands of hundreds of tire repair shops and garages.

The No. 200 Brown Steam Tube Vulcanizer is fitted with four quick-acting, adjustable clamps which hold the tubes in position under any desired pressure while they are being cured.

The clamps are attached to back of tube vulcanizer and can be swung to one side or the other while not in use or while tube is being placed on vulcanizer.

The top of the plate is finely machine-finished and polished. It is 25 inches long and 6 inches wide.

The boiler and plate are cast in one solid piece. Furnished complete with steam gauge, safety valve, filler and filler valve.



No. 200—Brown Steam Tube Vulcanizer

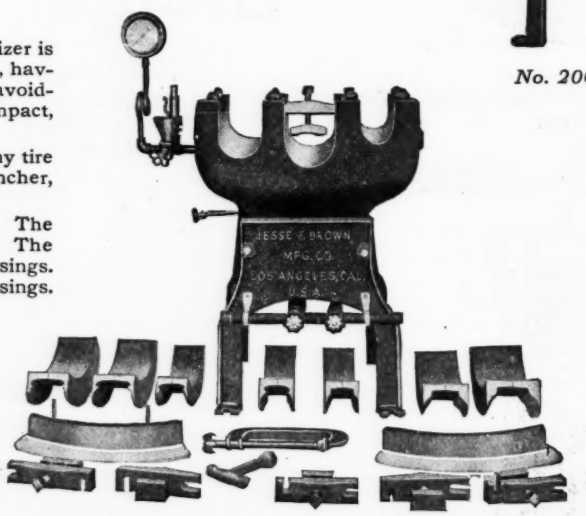
THE No. 100 Brown Sectional Vulcanizer is steam jacketed and cast in one piece, having no packed or bolted joints, thus avoiding the possibility of leaks. It is very compact, only occupying a small space.

This vulcanizer will cure perfectly any tire made, from 3 to 5½ inches, including all clincher, quick-detachable and straight-side types.

The cavities are all one-fifth circle. The small cavity cures 3 and 3½ inch casings. The medium cavity cures 4 and 4½ inch casings. The large cavity cures 5 and 5½ inch casings.

The vulcanizer is equipped with steam gauge, safety valve, filler and filler valve and gas burner valve, so that steam can be generated in the vulcanizer.

If preferred, the vulcanizer can be furnished without burner, to connect direct to steam boiler.



No. 100—Brown 3-Cavity Sectional Vulcanizer



Brown Dry Cure Retread Mold

THE boiler and steam chest of the Brown Dry Cure Retread Mold are cast in one solid piece, the same as the No. 100 and No. 200, making each machine a single unit.

The Rib Tread is machined in the solid casting, and when tire is retreaded it has every appearance of a new cord tire.

Wood blocks are used for "dead ends" to prevent stock from flowing or blistering at the end of each cure and to make a smooth and perfect cure at the laps.

Each mold is equipped with five heavy clamps capable of producing a very great pressure, which is quite neccssary when curing. The molds are made of semi-steel and are tested to 150 pounds cold water pressure.

Manufactured by the
JESSE F. BROWN MFG. CO.

Sales Department:
THE BAILEY-DRAKE COMPANY, *Inc.*
1120 S. Michigan Ave., Chicago, Illinois

When Springs Break, put on VULCAN

The Replacement Spring



VULCAN SPRING-SERVICE

is nationwide because the nation made it so. A million dollar advertising campaign could not have forced VULCAN Springs on an unwilling public.

Motorists *wanted* VULCAN Service. Therefore, 8000 stations offer replacement springs of highest quality *for every car*, put on without delay.

Motorists will continue to want VULCAN Service. For the wise dealer, permanent profit lies in supplying that want.

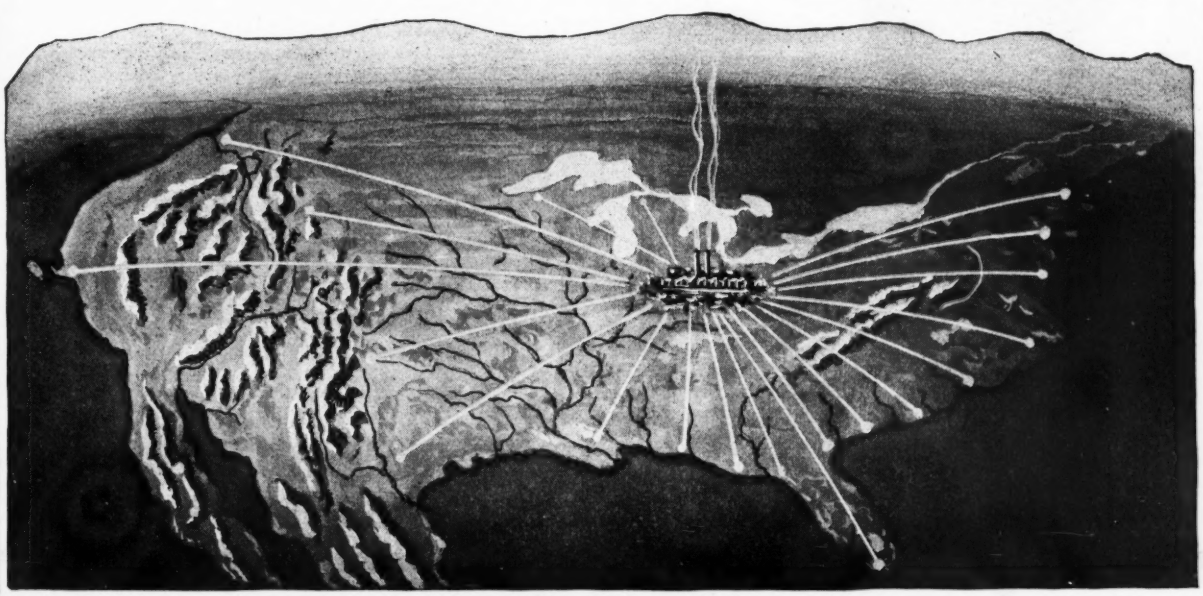
The VULCAN Spring Rack is sent free with your first order for VULCAN Springs.



Jenkins VULCAN Spring Company

Factory, RICHMOND, IND.

Branches: **Atlanta, Ga. Dallas, Tex. Minneapolis, Minn. Boston, Mass. Kansas City, Mo. Reading, Pa. St. Louis, Mo.**









Anyone can install VELVET GRIP in half an hour, right on the old band. It saves money and increases comfort. Complete directions included with every set.

That Nerve-Racking, Car-Ruining, Gas-Wasting Chatter Is Now Only a Memory to Users of "VELVET GRIP"

WHERE is the Ford owner who hasn't shuddered at the sight of his car performing an involuntary shimmy every time he applies his transmission brakes or changes his speeds?

That brake chatter is bound to rattle the car into a premature breakdown—shorten its service-life—besides shaking and jarring the passengers into a perpetual state of discomfort. It's a money waster and a joy killer. **And it keeps growing worse.**

The new VELVET GRIP was badly needed!

VELVET GRIP is a device, which, by a scheme of leverage, lifts the ends of the transmission band off the drum—at the point where the hardening occurs that causes the chatter. With VELVET GRIP on, the brake band ends cannot possibly make that troublesome contact with the drum—***chatter is absolutely impossible.***

It saves gas. Without VELVET GRIP, the Ford transmission brake band is never entirely released from the drum, even when the brake is not applied. Hence there is always considerable resistance—an absorption of power that uses up fuel needlessly. VELVET GRIP **pulls the band clear of the drum when the brake is off,** permitting the full power of the engine to be transmitted to the rear axle—***where it belongs.***

List Price—$1.60 complete—ready to install.

Dealers and Garagemen: To kill the transmission-brake-band chatter for good and all, is to make a friend for life of every Ford owner in your territory. And VELVET GRIP does nothing less than that. Its got about the biggest market in the whole Ford accessory field. Quick sales are a certainty. Good discounts and generous sales co-operation. Write at once for full particulars.

Velvet Grip

TAKES THE CHATTER OUT OF FORD TRANSMISSION BANDS

MIL-MAC MFG. CO., 1714 N. Broad Street, Philadelphia, Pa.

The automotive industry is the second largest in the world. It has a greater demand for experts and a smaller supply than many of the smaller industries. And the reason is that the automotive industry is new—in its youth. ...Now is the time to break into the big things where real brains and ability earn unlimited opportunity and extraordinary incomes.

Garagemen—Increase Your Shop Efficiency—and Your Profits
Mechanics—Don't Be Satisfied To Be an Ordinary Mechanic—Be an Expert

A Little of Your Time Now Will Make Big Money for You Later

Nobody is too old to learn—it pays to learn while you are young. A few minutes sacrifice now, during your spare time, will mean many hours of happiness and financial contentment later. If you look about you, you will find that the man with a super amount of energy is the man who always gets to the top—and whoever said that it takes hard work to make a success positively knew what he was talking about. Now is the time to get out of the rut—and improve your ability for the big opportunity.



More Garages Need Experts Who Really Know How

How many real experts could you name in your own territory? Isn't it a fact that there are very few exceptionally capable mechanics in your territory who really understand the work they are doing? Isn't it a fact that those who are really experts are always overloaded with work—and in big demand? Car owners always seek the man who KNOWS HOW.

Send for This Prospectus

It won't cost you anything to find out what our course it like. By writing for it, you can get a copy of our prospectus, and for the price of a regular evening's entertainment, you can buy this entire course.

You Can't Make Good Pay Guessing—Car Owners Demand Real Ability and are Willing to Pay for it.

The Cost Is Nominal and You Pay While You Earn

Knowledge is better than money, because you can lose your money, but you can't lose knowledge; and if you have knowledge you can earn more money. If it were possible for you to hand someone a lump sum of money, and receive in return the knowledge that would make you an expert mechanic—you would buy and buy quick. Nobody could make good on such a proposition but you yourself can develop this ability for a very few dollars. We can show you how—and if you have the ambition, you can convert our instruction into actual knowledge. You will never regret spending only a small part of a week's wages to equip you to more than triple your present earning power.

Garagemen—Talk This Over With Your Deserving Mechanics

A garage or service station is judged by its class of skilled mechanics which it employs. Car owners soon find out which garage has mechanics capable of doing good work. And this reputation means profitable business. If you have a deserving employee, give him a raise at once, and convert this raise into the tuition fee for this course, which will make him valuable in your employ, and valuable to himself.

Local representatives are now being appointed in all unassigned territories. You can make some extra money during your spare time explaining this course to other mechanics. *Write for details.*

Special Service

The Automotive Educational Bureau arranges its service to suit the individual need of its subscribers. If the subscriber does not require special service the bureau has a regular outlined series of instruction papers. In addition, the bureau will furnish advice and information pertaining to both the studies and the problems that may arise in the subscriber's daily work. There is no extra charge for this special service.

Outline of Study

The prescribed outline of study includes information on every subject pertaining to automotive engineering. Every unit of the automobile is described in a manner which is easy to read and easy to comprehend. This INDIVIDUALIZED CORRESPONDENCE concentrates exclusively on the work in which you are vitally interested. It presents the fundamental principles in such a way that you can absorb and retain them with a minimum of time and study.

Automotive Educational Bureau 1203 Farnam St. OMAHA, NEBR.

Automotive Educational Bureau,
1203 Farnam St.,
Omaha, Nebr.

Gentlemen:

Kindly forward a copy of your new prospectus and also full information concerning your course of training for garage owners.

( ) Garage Owner.
( ) Mechanic.

Name .....

Address .....



Goodyears Preferred—

Out of 33 cars entered in the 1919 Indianapolis Race, over 80% were equipped with Goodyear Detachable Wire Wheel Rims.

Every car that finished the race was fitted with Goodyear Detachable Rims.

This remarkable performance was duplicated at the Sheepshead Bay Race in which every entry used Goodyear Detachable Rims on their wire wheels.

No severer strains can be imposed on a rim than during the course of a race. In these two blue ribbon racing events Goodyear Detachables proved their absolute reliability.

The popularity of Goodyear Detachable Rims is, therefore, self-evident. It is not surprising, then, that *over* 80% of all automobile wire wheels using straight side tires are equipped with these rims.

Note angle of side ring groove which locks side ring to rim at every point of its circumference.

Cleveland Welding



They Stood the Test

Goodyear Detachable Rims have strength, lightness, and simplicity of construction. They consist of a continuous, one-piece base and a side ring which locks in an angular groove. Side ring fits snugly in the groove and locks firmly around the entire rim circumference.

Tires can be changed easily and quickly on Goodyear Detachables. A screw-driver is the only tool needed. The complete operation takes but three or four minutes.

Cleveland Welding products include Goodyear Detachable Rims for Wire, Disc and Wood Wheels; Goodyear Demountable Rims; Standardized Demountable Rims; Clincher Rims; Tire Bases for Solid Tires; Flanges and Motor Truck Wheel Bands; Gear Ring Forgings; Special Electrically Welded Rings; Special and Irregular Shapes of Tubing.

THE CLEVELAND WELDING & MFG. CO.
of THE HYDRAULIC PRESSED STEEL CO.
Cleveland, Ohio
BRANCH SALES OFFICES:

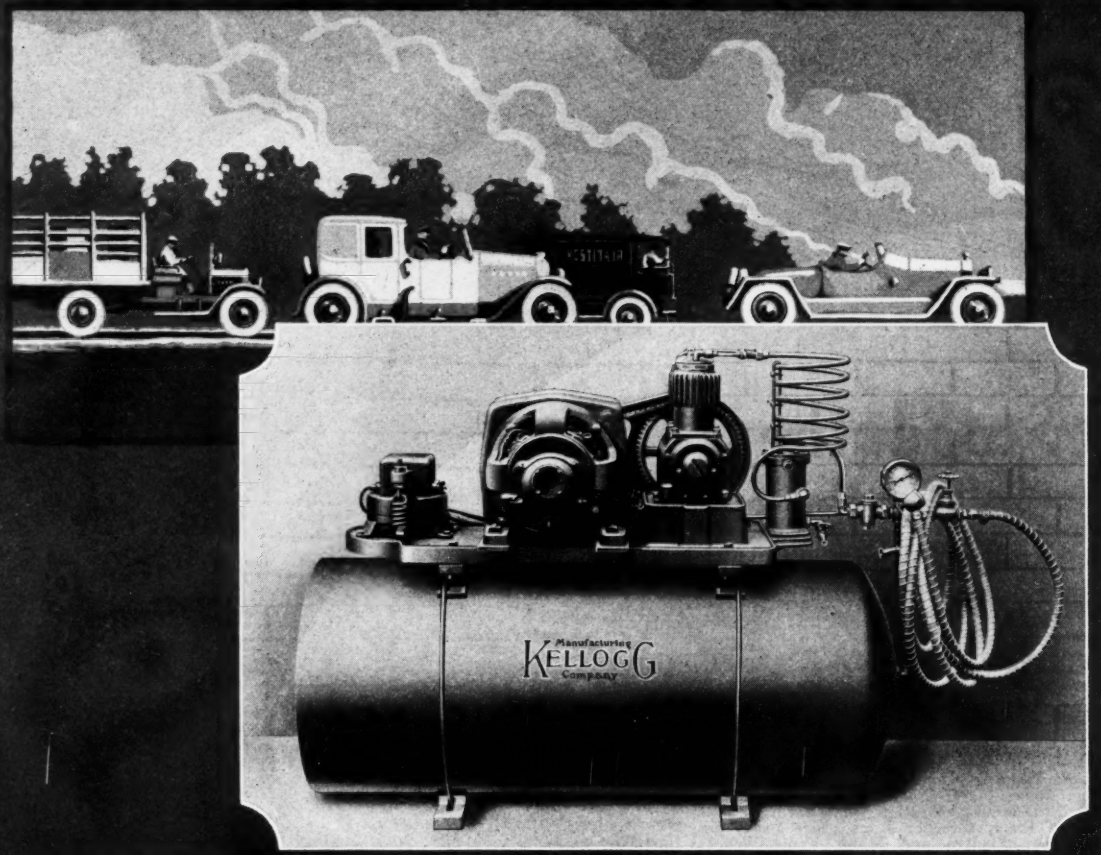
New York	Chicago	Detroit
Singer Building	Fisher Building	Book Building



"MORE Than a Place to Work"

"It may be that *you* would be interested in obtaining a copy of the Hydraulic Press. It does not treat of sales. It was not printed for you. It is a publication edited by the men in the plants. It might give you confidence in the spirit of Hydraulic and show you that the same spirit is reflected in the quality of Hydraulic products."

& Mfg. Co. *of the* HYDRAULIC PRESSED STEEL CO.



Granting that a Garage Tire Pump is an economical necessity in these strenuous days, it then only remains a matter of selecting one that will render its per dollar cost value up to the highest point of years in service and freedom from repair bills.

IT is the experience of Kellogg Pump users that Kellogg Products are rendering a quota of service that gives them pronounced pre-eminence in the field they occupy.

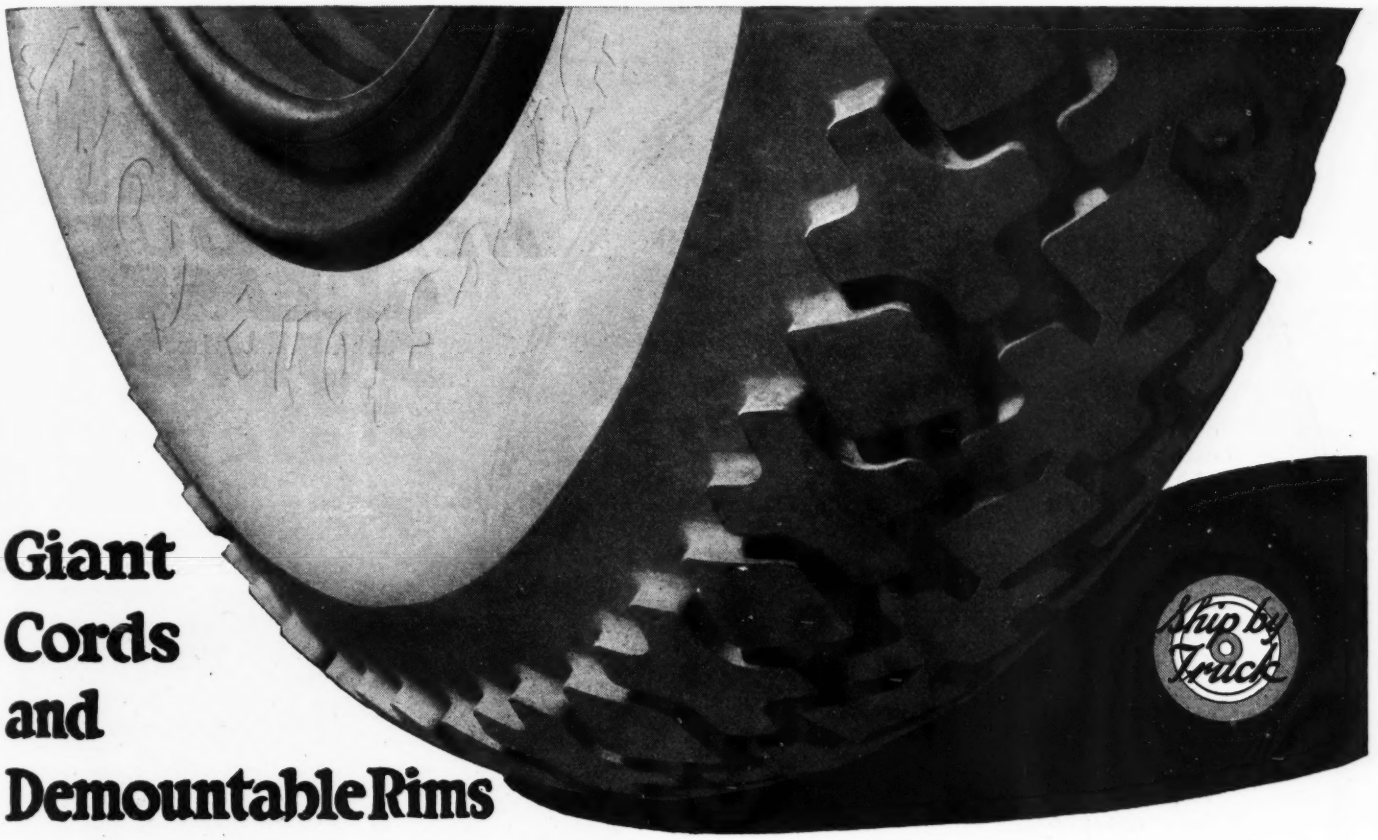
The Kellogg Garage Tire Pump is but the usual physical expression of the following policy which obtains here and from which we never deviate.

With us the word "quality" holds no empty meaning. It stands out where all may see and experience. It is the finished expression of all that makes for the highest in design, materials, workmanship and finish.

When you own a Kellogg Pump you are assured that you have the best. Its service will make assurance doubly sure.

KELLOGG MANUFACTURING COMPANY
Rochester. New York

KELLOGG
ENGINE DRIVEN
Tire-Pump



Giant Cords and Demountable Rims

Reasons why—Over half the truck tonnage of America is carried on Firestone Tires

THE Firestone Giant Cord Truck Tire has contributed safety and economy to trucking while making higher speed possible. More strength, more air space, greater traction surfaces, extra heavy non-skid tread—these things are giving a greater measure of mileage service to all Firestone users.

And Firestone engineers have perfected the Demountable Rim that holds these Giant Cords to the wheel.

This saves much time on the road, permitting quick and easy tire changes while preserving great strength with minimum weight.

Firestone

Most Miles per Dollar

O'BRIEN TRADE MARK HEAVY DUTY GREASE PUMP

The Only One Man Heavy Duty Grease Pump on the Market

The O'Brien HEAVY DUTY Grease Pump is a real machine, incorporating CLEANLINESS, ACCURACY, SPEED and EASE in operation, SIMPLICITY in design and highest QUALITY in MATERIAL and WORKMANSHIP in construction.

One stroke of the pump will deliver two pounds of grease with positive accuracy.

A gauge graduated for light, medium or heavy grease, easily read by either operator or customer, shows exactly how much grease is being pumped.

The pump is positive in action with a special designed piston and positive hand operated valve.

The O'Brien tank is made of 18 gauge steel reinforced, and has a capacity of ¼ barrel.

The truck is of heavy angle steel construction throughout. Three large heavy duty casters make it easily portable. Requires a minimum of floor space.

Let us show you how the O'Brien Heavy Duty Grease Pump will increase your sales—and show a profit on the differential grease and oil which you sell.

If your jobber can't supply you, write for information.



SYLVESTER L. O'BRIEN **6014 Broadway** **CHICAGO**

Why a Mutual Truck Agency Will Pay You Handsomely

If you are now handling a line of motor trucks and want to change to a line that will sell quicker and stay sold with less effort and service-cost, look into the

MUTUAL

America's Greatest TRUCK

If you have hesitated about handling a truck—waiting till the one best truck arrived, look into the

MUTUAL

"America's Greatest Truck"

A study of our super-specifications (send for the circular) will convince you that the "Mutual" IS "America's Greatest Truck"—because we have put into it all the top-notch features of all other high class trucks, and have adopted every unit **over-size,** so that our 2-ton Mutual is actually a 3-ton truck; our 3½-ton Mutual approaches other 5-ton trucks and our 5-ton Mutual the equal of most 7-ton jobs.

Not only is it bigger all over, but its **regular equipment** includes

Electric Starting and Lighting	Roomy, enclosed Cab
Double Control Governor	America's Greatest Engine
Bound Brook Bushings	America's Greatest Clutch
Metal Wheels	America's Greatest Universal
Over Size Tires	America's Greatest Steering Gear
Pressed Steel Frame	America's Greatest Ball-Bearing Axles.

We Advertise FOR You. Not AT You.

We are now in the midst of the greatest "Business Journal" Campaign ever carried on by a motor truck company, using 65 of the leading trade and technical magazines read by

One Million Business Executives.

These are the manufacturers and wholesalers all around you—and their inquiries are coming in by the hundreds every week.

We also appropriate $150.00 a truck for your local newspaper campaign—you to spend a like amount—so that between us we'll run full page ads in your newapapers over your signature.

A Quick Turnover

You will sell 10 MUTUALS quicker and easier than you'd sell five trucks of any other make—and the truck is so big and "beautiful" that every one you sell will create a local demand for several more.

Come to Sullivan

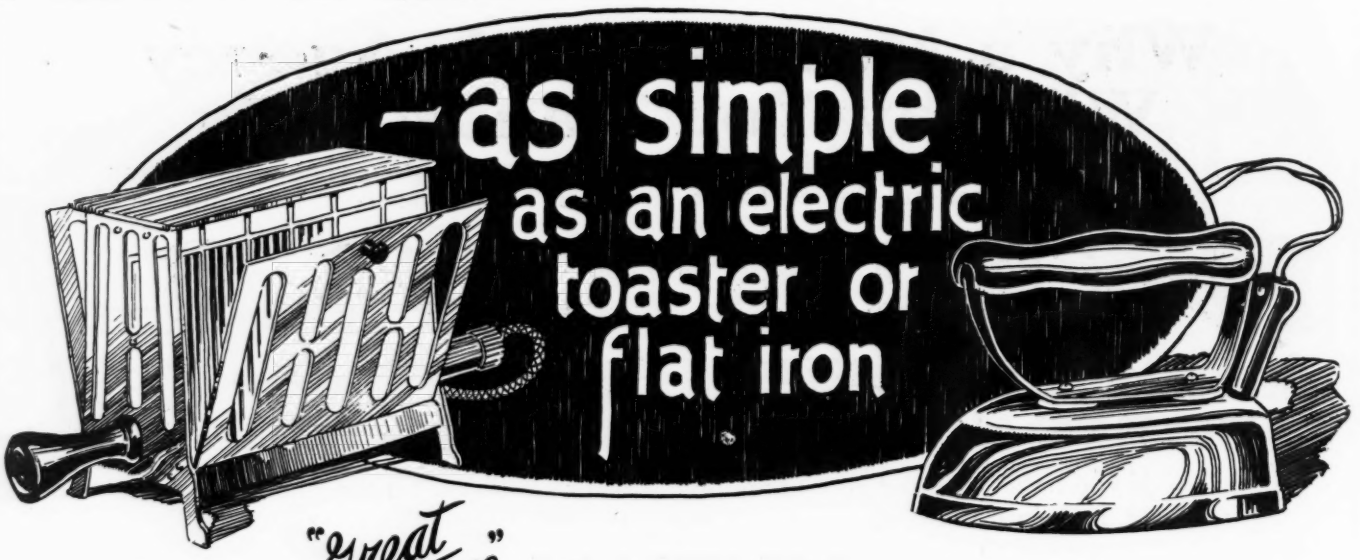
and see us building the Mutual Trucks in our big, modern plant, and let us show you the details of our wonderful advertising campaign.

(Sullivan is on the main line of the C. & E. I.—26 miles south of Terre Haute; also on a cross branch of the Illinois Central. Hourly Interurban service from Terre Haute.)

Come—we'll give you a royal welcome; and fill you so full of enthusiasm that you'll go back ready to take command of the heavy-truck situation of your county or community.

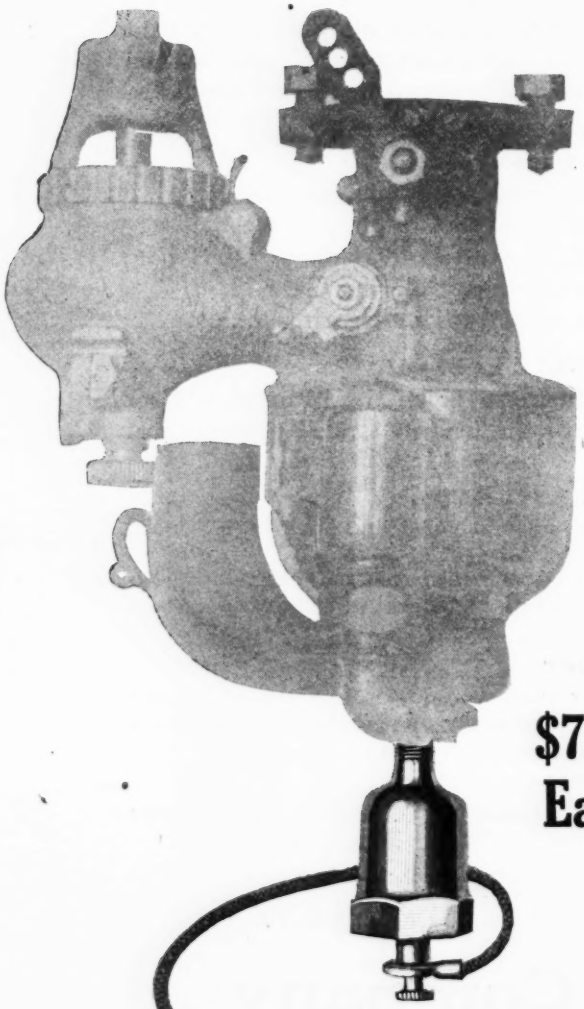
Mutual Truck Company

Sullivan, Indiana, U. S. A.



The "Great Western" Carburetor Heater

Boils the Gasoline and Makes Starting Easy in Cold Weather



Cold water starting troubles are caused by the fact that cold gasoline will not quickly vaporize. The GREAT WESTERN CARBURETOR HEATER will boil gasoline in 45 seconds. In less than a minute it supplies plenty of gasoline vapor for the spark in the cylinder to ignite.

The heater can be attached quickly to any make carburetor. It operates on current from the storage battery. The gasoline passes into the heater and is superheated by an electric coil. It works just like any electric iron or toaster. A neat appearing switch on the dash board permits a convenient switching on and off.

THE ELECTRIC CARBURETOR HEATER IS A PROVEN SUCCESS. Before this heater was placed on the market repeated tests were made under the most severe conditions. Its success was assured from the start.

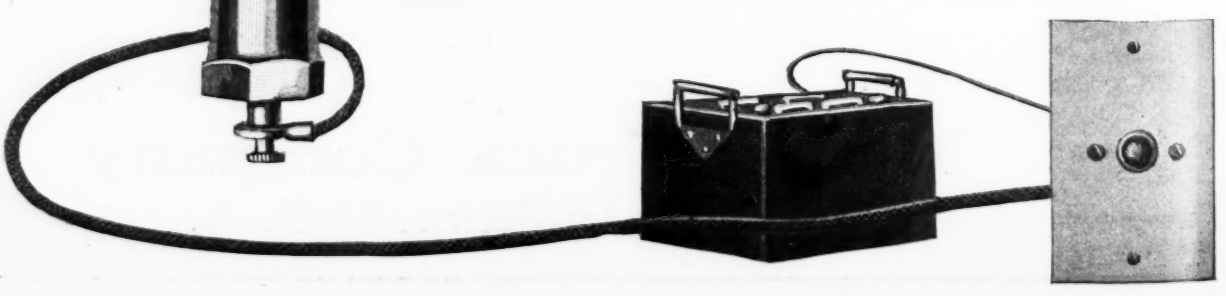
DEALERS: Now is the time to stock up. A demonstration will sell the heater every time. There is a big demand for the GREAT WESTERN CARBURETOR HEATER—the neatest, most practical, and efficient device of its kind made. Nothing to break or get out of order—nothing to adjust.

A Big Seller—That Pays. This is the biggest merchandising opportunity ever offered to dealers. It is an out and out dealer proposition—a proposition of the manufacturer selling direct to the dealer and sharing the jobber's profit with the dealer. Consequently, the dealer's discount is unusually generous.

Send for your demonstration set today and start taking orders for a big volume of business—and profits.

$7.50 Each

"Great Western" Commercial Body Co.
OMAHA, NEBRASKA





STANDARD AUTO JACKS

TRADE MARK

"Give Your Sales a Lift"

DEALERS —

Now-a-days, stock of most any kind runs into a lot of money. However, it doesn't make so much difference how much the investment is, if you can sell your stock and turn your investment over quickly.

STANDARD AUTO JACKS won't stay on your shelves very long. Why? -- Simply because their quality stands out to such a degree that the average buyer will choose a STANDARD every time.

This is the class of stock YOU NEED — a complete line of auto jacks that you can recommend and know they will actually "make good" for the most critical demand.

Give your favorite jobber a trial order. Display your STANDARDS prominently and see how quickly you can turn your investment over —and over again.

We have a mighty interesting selling plan for dealers. Drop us a card and we will forward full particulars.

NATIONAL-STANDARD CO.
Eighth Street,
NILES, MICH., U. S. A.

STEPHENS *Salient Six*

This splendid Coupe, built by a company famous for its fine bodies, is mounted upon the Stephens chassis, which contains the most powerful and most economical engine for its size found in passenger automobiles.

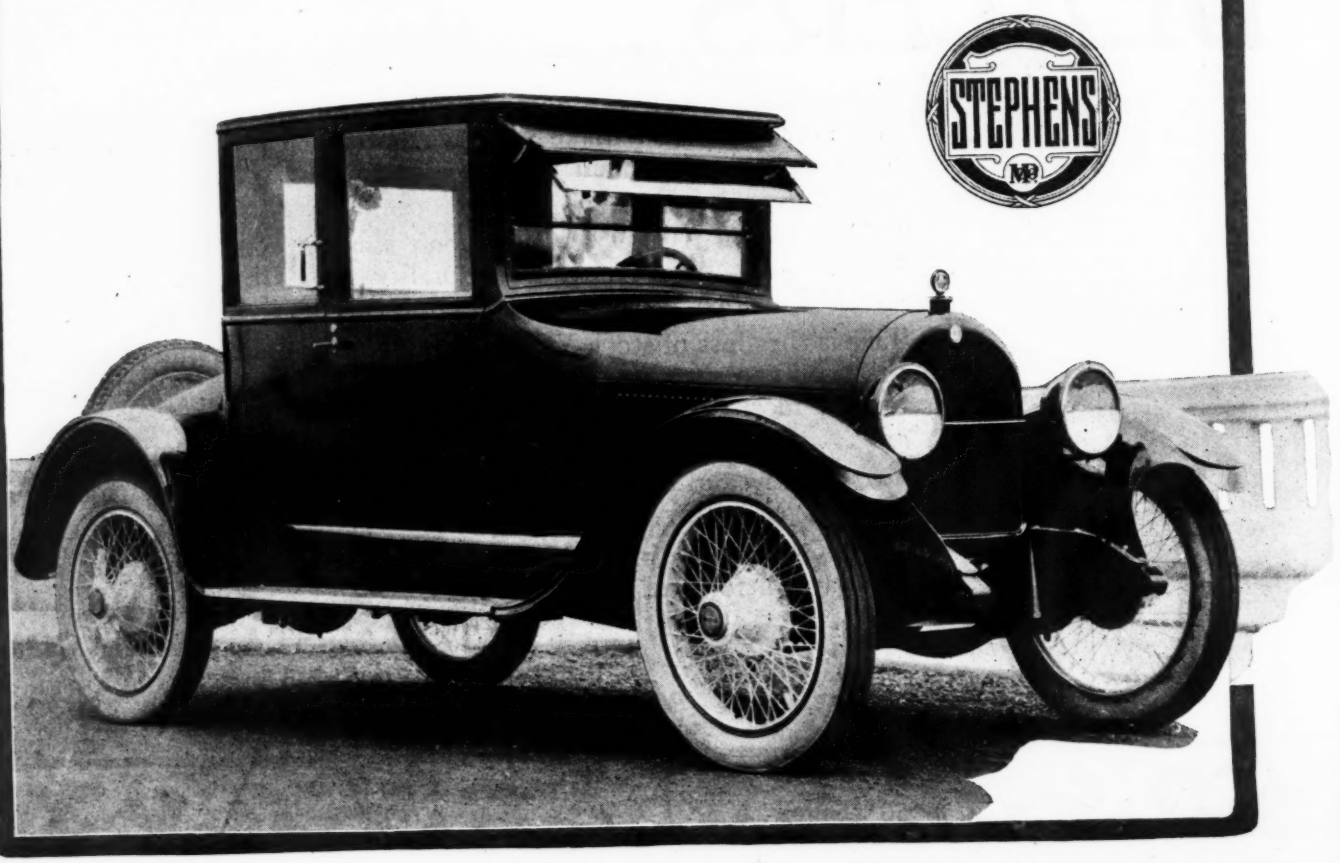
Naturally the surpassing excellence of these features in one motor car, afford the height of motor car satisfaction in value and in service.

Examination will reveal many other features in addition to those approved comforts and luxuries that you would naturally expect in a fine car.

MOLINE PLOW COMPANY.
STEPHENS MOTOR WORKS
MOLINE, ILL.

Factories: Freeport, Ill.

Stephens Salient Six Coupe
3 or 4 passenger
122 inch wheelbase; 57 H. P.
Fisk Cord Tires Standard



This—→ is the First Advertisement of the CLOVER

National Advertising 1919-1920

It appears in the Literary Digest for October 25th, Colliers Weekly for Nov. 1st and The American Magazine for December.



A New Clover Branch in Chicago

at 601 West Adams Street

Fully stocked and ready on Nov. 15th to fill your orders for the famous CLOVER Grinding and Lapping Compounds and CLOVER Lawn Mower Sharpening Compound.

Clover Service is Dependable and Complete

In order to provide better service for our customers, we opened, on January 1, 1919, our San Francisco Branch at 558 Howard Street.

Following out this same policy of taking care of our customers' requirements in the best possible manner, we now offer to Clover distributors the advantage of a fully stocked branch warehouse in Chicago, at 610 West Adams Street.

Clover Compounds Are Nationally Advertised

Our big National Advertising Campaign is now running in full page space in Collier's Weekly, The Literary Digest and The American Magazine, reaching a total of nearly 4,000,000 readers.

The demand for Clover will be greater than ever. PLACE YOUR ORDER NOW so as to be fully prepared for a wonderfully increased demand.

Clover Lawn Mower Sharpening Compound will be Nationally Advertised in the principal boys' publications and standard magazines, beginning in January.

Send now for samples and cuts for your catalog.

CLOVER MANUFACTURING CO., 110 Main St., Norwalk, Conn. U. S. A.

Chicago Branch: 610 West Adams Street **San Francisco Branch: 559 Howard Street**

3,000,000 Cans of Clover Sold in 1918

How Many Car Owners In Your Town Are "Tire Wise"?

TRED-WEL TIRES



WHEN a man has been driving a car for a few years, he begins to learn things about tires. He gets "tire wise." He knows there are quality tires at high prices and quality tires at medium prices. He is no longer willing to pay a premium for quality on the basis of "playing safe." What he wants is a good tire, with plenty of quality, but he wants it at a price that makes it a 100 per cent investment.

In other words, he becomes a more discriminating buyer. He chooses more carefully. He wants to get one dollar's worth out of every dollar he puts into a tire. And if **you** can give him that, he will buy tires from **you.** He'll be a regular customer.

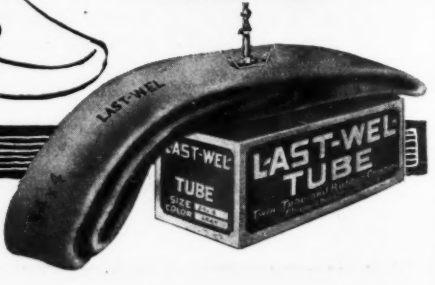
Tred-Wel Tires are good merchandise to show to the "tire wise" buyer. They are the kind of tires he wants. When he uses them once he wants them again. When he buys Tred-Wels, he is paying a medium price for high quality tires. He gets his full money's worth.

Try Tred-Wels on the "tire wise" drivers in your town. Put our story to the test. Our sales plan will be sent to you on request. **Write for it.**

TWIN TUBE AND RUBBER CO.

Address Sales Dept., 1002 S. Michigan Ave.
Chicago, U. S. A.
Factory and General Offices
Chicago Heights, Ill.

LAST-WEL TUBES





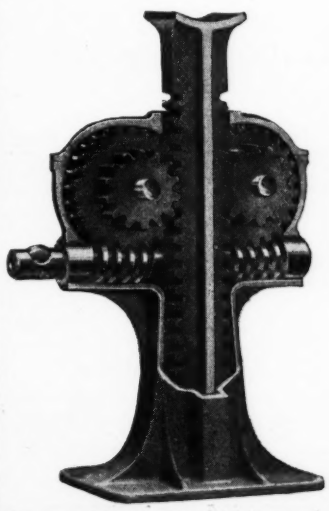
THE double worm gear drive principle is patented and adopted here for the first time in any jack. Side strain and end thrust are eliminated and friction reduced to a minimum.

RAISING the car is by far the simplest and easiest part of making tire changes since the advent of Rees Double Worm Gear Drive Jacks. It's the cleanest part of the job, too.

Winter's wet and slush doesn't bother the Rees owner. The long folding handle enables him to place the jack under the axle and to operate it from a standing posture.

The car is lifted with a few easy turns of the handle and the load is held safely at any height.

Rees Jacks combine great power and dependability with convenience, speed and ease of operation. The unique Double Worm Gear Drive principle and our high standards of materials and workmanship makes this possible. Rees Jacks can be depended upon to meet any emergency.



Jobbers—Dealers.

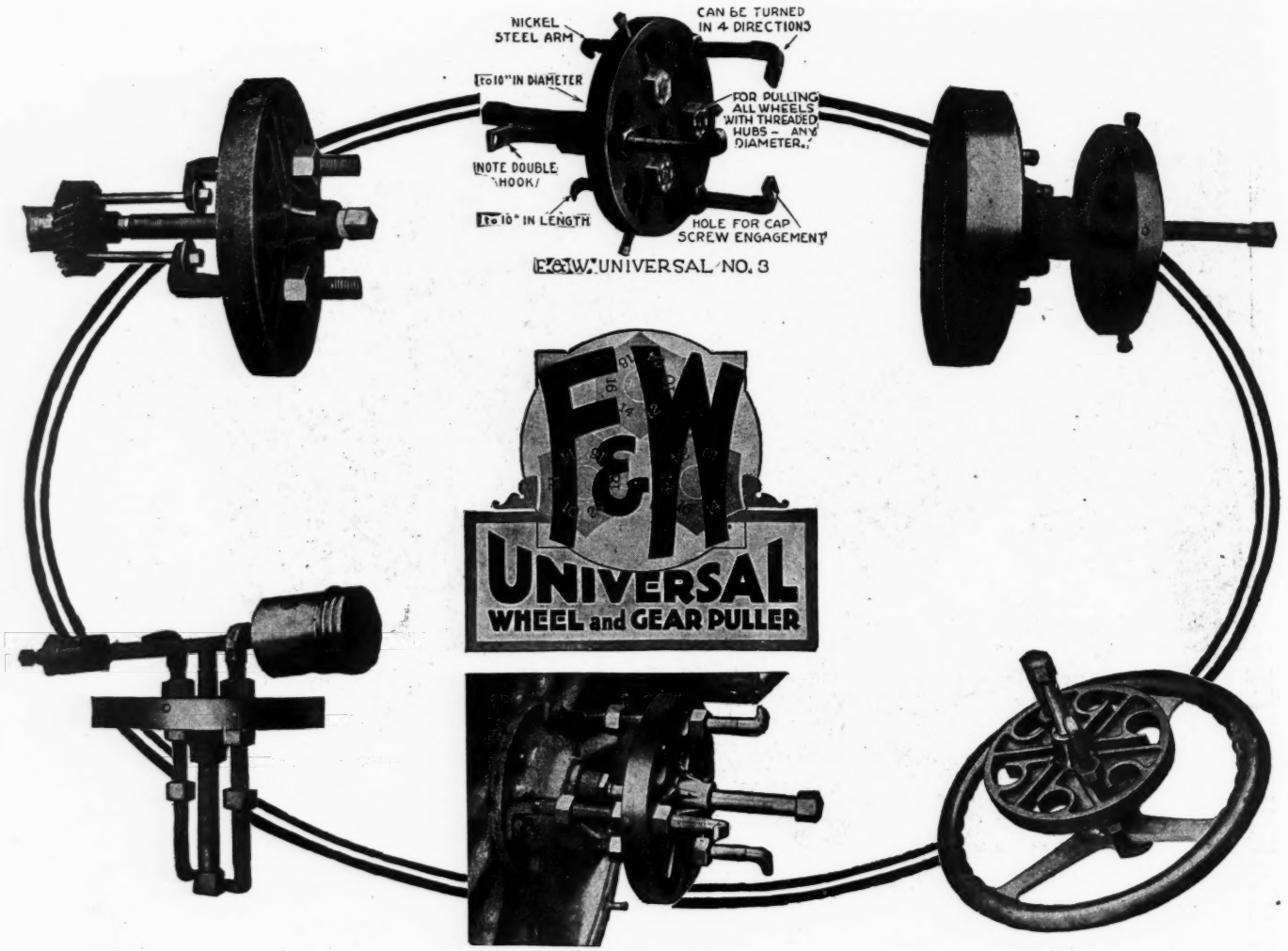
The Rees Line includes Jacks for automobile, motor truck, railway, mining and industrial uses. Rees Jacks are nationally advertised—nationally known. The growth of sales have been phenomenal. Write us regarding our highly profitable proposition.

Iron City Products Company

Department 17, 7501 Thomas Boulevard,

Pittsburgh **Penna.**

Rees No. 1, passenger car model, with long folding handle fits readily in any tool box. Capacity 2 tons, Price $9.00; West of the Rockies $9.50.



THE UNIVERSAL WHEEL GEAR PULLER

Is the Only Single Tool on the Market That Will Pull Any Wheel or Gear on Any Car Truck or Tractor

The F & W is one of the most useful pieces of equipment any garage could possibly acquire.

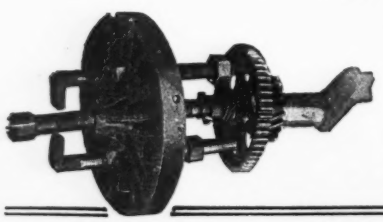
It combines in one tool a device which can be used on any wheel or gear pulling job.

It has stood every possible test on all kinds of operations without a single failure, and will fit any hub for wheel pulling.

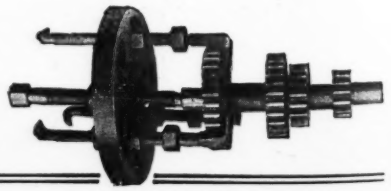
The F & W is the only universal wheel and gear puller in the market and as a time, labor and money saver, it is unequalled.

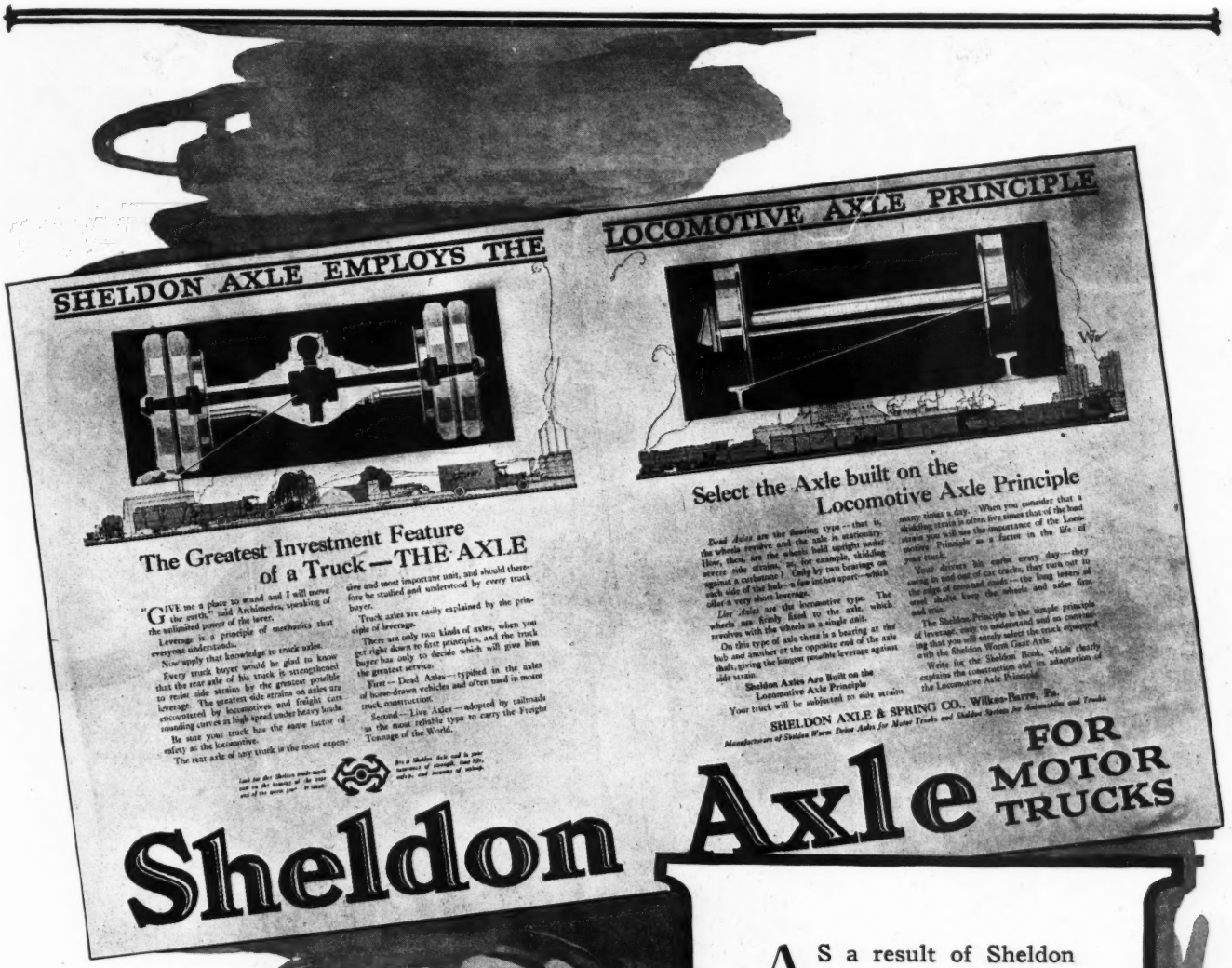
For further information, write your jobber.

Send for our illustrated Booklet TODAY



Sales Department
THE ZINKE COMPANY
1323 S. Michigan Ave.
Manufactured by
F & W MANUFACTURING COMPANY
INDIANAPOLIS, INDIANA





AS a result of Sheldon advertising the truck user is acquiring a fund of valuable information that is proving extremely useful to him when investigating the claims of truck salesmen.

Sheldon equipment will have more than ordinary influence on his choice—for it will mean favorable prejudice at the start. And early impressions are frequently decisive.

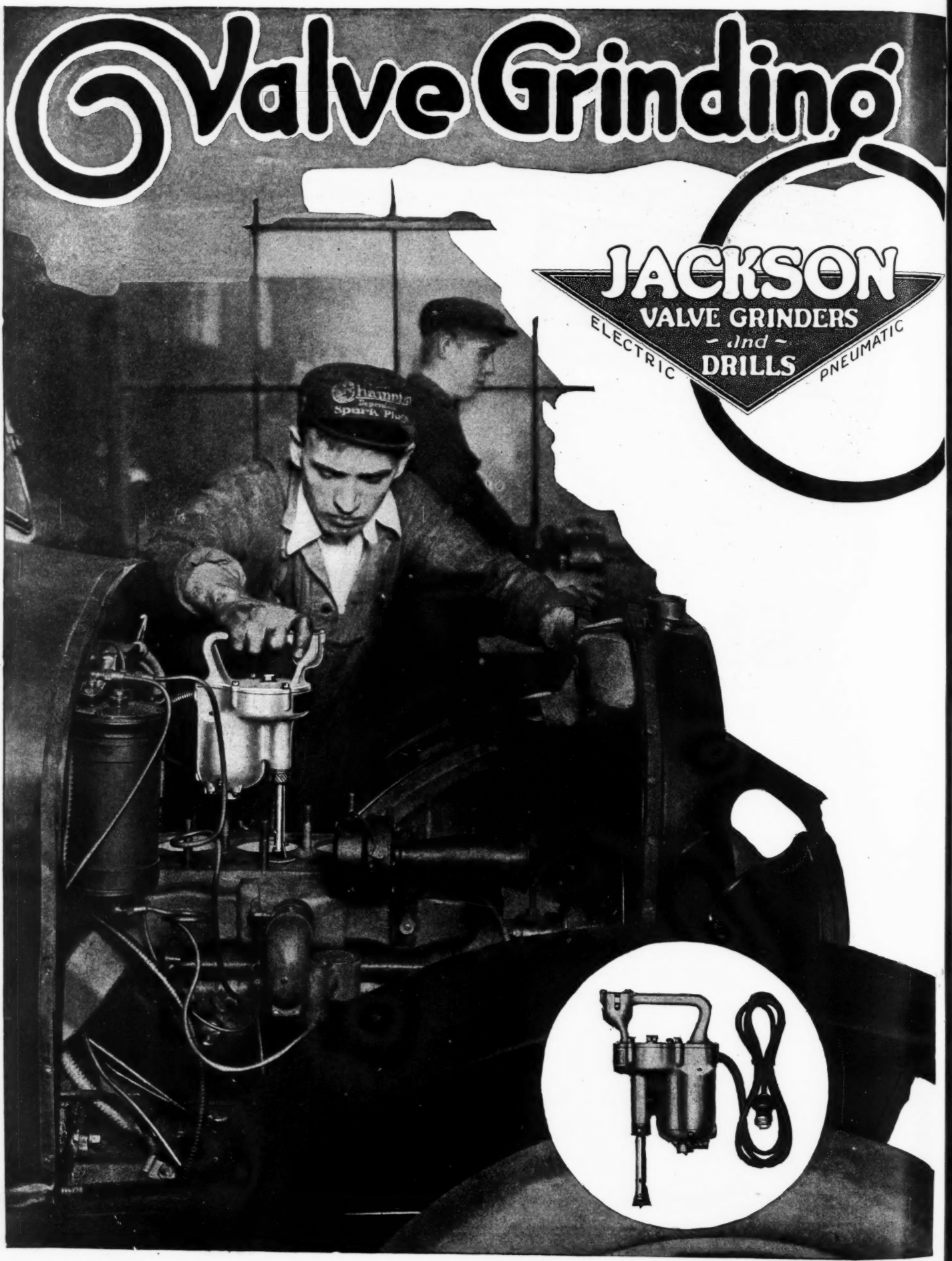
Sheldon Axle & Spring Company

Makers of Springs and Axles for Heavy Duty Service for more than 50 years.

Wilkes-Barre, Penna.

Valve Grinding

JACKSON
VALVE GRINDERS
- and -
DRILLS
ELECTRIC PNEUMATIC



Made More Profitable

Faster — Cheaper — Better

The JACKSON Pneumatic Valve Grinder is light. It is made of aluminum and has no electric motor. Can be used continuously without tiring the operator, using your present air supply. The speed is always under the control of the operator, and can be varied from 50 to 1000 strokes per minute without changing tools or stalling the operation. You need never go over a JACKSON-ground valve the second time. The JACKSON Pneumatic Grinder grinds any size valve. Its low cost of operation makes it the choice where profits count.

Jackson Electric Valve Grinders

JACKSON Electric Valve Grinders lead in their field. All parts are interchangeable with the JACKSON Pneumatic Grinder except the air motor. The JACKSON specially designed electric motor permits the use of direct or alternating current. Any mechanic with ordinary intelligence can grind a seat perfectly with it in from 15 to 30 seconds.

Jackson Pneumatic Drill

The JACKSON Pneumatic Drill is designed for drilling iron or steel, and will handle holes from 1-16″ in diameter to 1-2″ on 80 pounds of air. Operates on the ordinary garage type inflating pump with remarkably low consumption of air. Weighs only 6 1-2 pounds and is one of the easiest drills to handle.

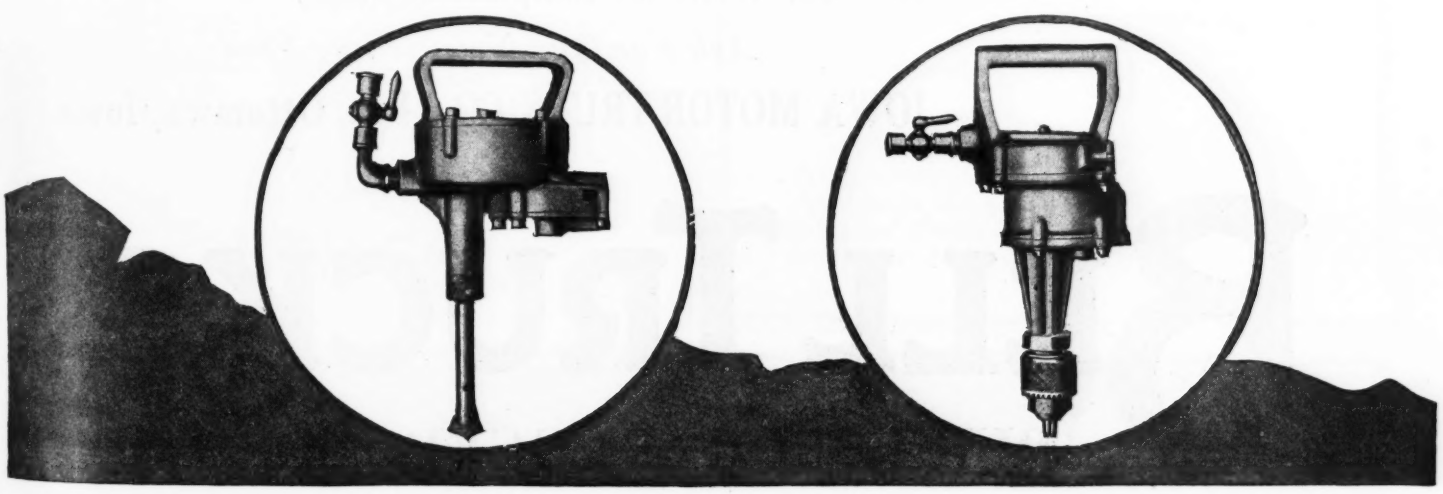
Dealers: Most jobbers stock JACKSON Precision Tools. Ask your jobber what they will do.

Full particulars on request.
Sales Department

BAILEY-DRAKE CO., Inc., 1120 S. Michigan Ave., Chicago

Manufactured by

Kalamazoo Railway Supply Co., Kalamazoo, Michigan





1½, 2½ TON CAPACITIES

It's a Pleasure to Sell Bell Trucks because there's never a come back and the Profits warrant real sales efforts

Marvels in the motor world are like all other wonders. They come with a rousing welcome, disappear soon after and are forgotten. The BELL Truck is not a marvel.

But it is built from a vast knowledge gained from long experience in a successful effort to produce an honest truck — rugged in service — dependable 365 days in the year. There's never a come-back.

Amply powered for all kinds of work, strong and sturdy throughout, BELL Trucks represent a logical business investment.

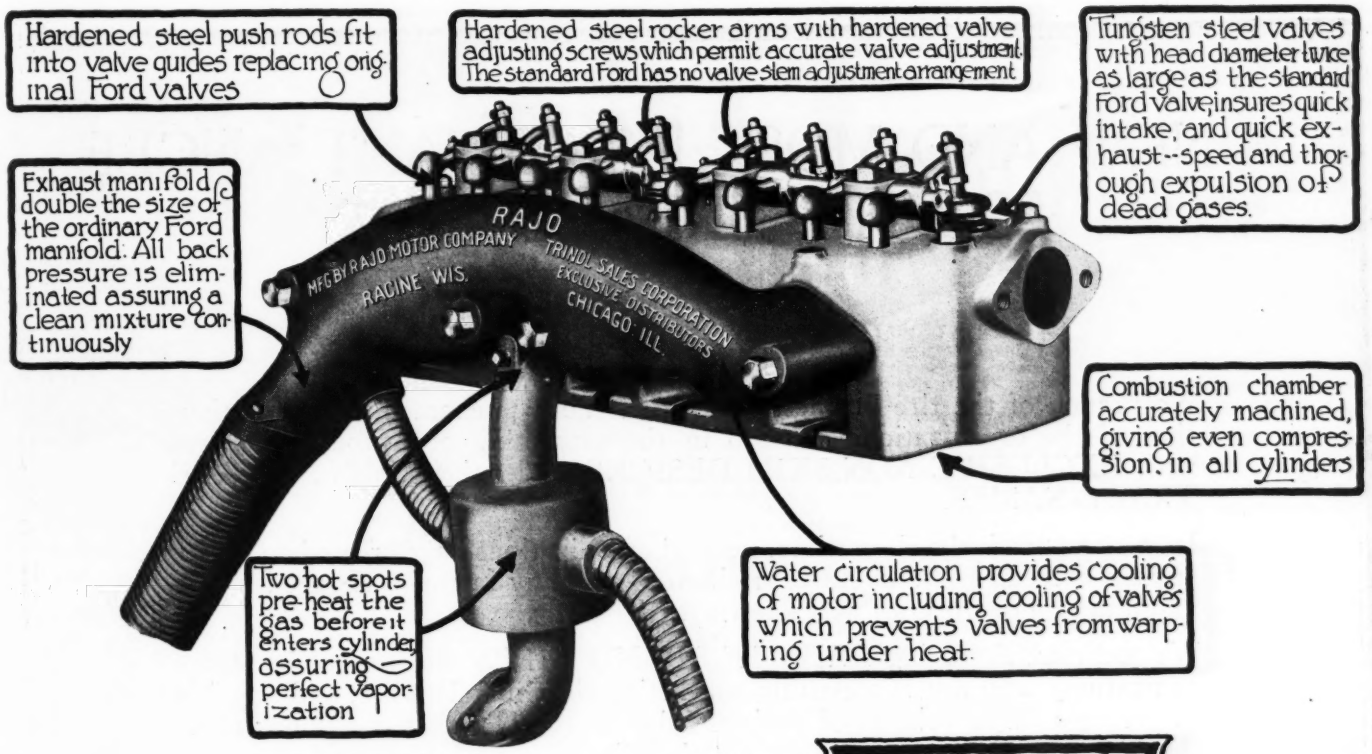
For dealers who come up to the BELL standard, we have a liberal sales plan. Immediate deliveries are assured. Write for complete details.

Ask For Our New Selling Plan

IOWA MOTOR TRUCK CO., Inc., Ottumwa, Iowa

BELL TRUCKS

BUILT FOR RUGGED SERVICE



AUTOMOTIVE PRODUCTS
RAJO
VALVE IN HEAD FOR FORDS
TRADE MARK

Manufactured By

RAJO MOTOR CO.

Racine, Wisconsin

Dealers—Order from Your Jobber

Jobbers—Write for Our Selling Proposition

PRICE

$78.50

DEALERS

A Demonstrator Will Keep You Busy Taking Orders

The RAJO Valve in Head motor is not a novelty. It is a substantially built piece of equipment which overcomes every peculiarity of Ford engine design. For ease and quietness of running, speed and acceleration, extraordinary pick-up and power, the RAJO is unsurpassed. The RAJO construction assures motor flexibility, complete combustion and reduces carbon accumulation to a minimum.

A motor can be throttled down to from 3 to 4 miles an hour on high, and actual tests show a 30 per cent saving in fuel consumption. Now is the time to interest Ford owners in your territory. For those who intend to build fast Fords this winter, the RAJO is ideal. For smoother running Ford passenger cars, or for Ford truck economy, the RAJO will pay for itself over and over again.

Our Guarantee

We positively guarantee to refund the purchase price to anyone not entirely satisfied with the RAJO after it has been given a ten-day trial. Write for full particulars.

Trindl Sales Corporation ·· 61 E. 24th St. ·· Chicago
EXCLUSIVE DISTRIBUTORS

A NEW AND MOST IMPORTANT ANGLE TO THE TIRE INDUSTRY

No branch of the tire business has had a more phenomenal growth than that of the organizations engaged in the marketing of Automobile Tires with EXCLUSIVE NON-SKID DESIGNS, under their OWN PRIVATE TRADE-NAMES.

In a comparatively short time, several organizations have created an outlet greatly exceeding the average production of many factories engaged in the manufacture of tires, all well known to the trade.

We are manufacturing PRIVATE-BRAND TIRES for several large organizations who are successfully marketing their merchandise, and are able to create a large volume of business, due to the fact that under our plan, they are able to purchase their merchandise *at actual manufacturing cost,* and are not obliged to pay royalty on any manufacturers' name.

By purchasing merchandise in this manner they are able to have tires manufactured UNDER THEIR OWN BRAND from 35% to 50% lower than the average prices quoted for standard brands. We are in a position to manufacture PRIVATE-BRAND TIRES for Jobbers, Distributors, Mail-Order Houses, Wholesale Grocers, Wholesale Druggists, Paper and Hardware concerns, and others who cater directly or indirectly to those who are engaged in, or are interested in the sale of Automobile Tires.

To any concern who is in a position to market, or is now marketing a large number of automobile tires, and is willing to contract with our organization, we offer a very attractive proposition, including the manufacture of a complete set of tire mold equipment, to be the exclusive property of the concern accepting same.

The tires manufactured according to the conditions above stated, have guarantees ranging from 3,500 to 8,000 miles, depending on the quality desired, either fabric or cord. We are in position to quote figures which will enable *you* to go out in the open market and very easily meet competition. Our plan is one you will be glad and willing to entertain, affording absolute protection to your trade as well as to yourself.

Immediately upon your expression of a desire for complete details of this interesting proposition, our representative will call upon you, and explain details in full.

Mc NAULL TIRE & RUBBER COMPANY

Private Brand Tire Division

Sales Offices: 1432 Michigan Ave., Chicago, Ill.

DETROIT

The Auto Center is the Logical Place To

LEARN AUTO AND TRACTOR BUSINESS



Training for Head and Hand

There were 6,353,233 cars and trucks licensed in the United States up to July 1st, 1919. That astounding list has been added to every day since. The number is now well over seven million and several million more will be made during the coming year. Still the demand is far and away ahead of production. This means tremendous activity for producer and distributor of cars, trucks, tractors and every kind of equipment and accessory; and also for service stations and garages in every part of the country.

A Field With a Wonderful Future

Factories are rushed to the limit; garages and service stations are already crowded for the want of trained men to adjust and repair these thousands of machines. Competent men are wanted in every city and town for this vitally important work. Our Course teaches how to do this work,—it fits you to command big money.

Earn $100 to $400 Monthly

Many of our graduates earn even more than $400 monthly. Your earning power depends upon your Trained abilities,—what you know plus what you are taught and trained to do correctly. Our Course teaches you every fundamenal of the Auto Business. You are taught these things by actually doing them. You learn to make all kinds of repairs,—every make of car known comes to our Shop for attention. You have 20 to 30 cars to work on all the time. You get regular garage experience. Twenty-five different types of motors in our block-test department alone. When you complete our Course, you absolutely know Motors,—you have a training that enables you to command a big income.

What We Teach

Every phase of the auto business is covered in Our Course. Every part of a car and its operation is explained in detail. You are trained to handle any kind of car trouble. You are thoroughly instructed on engines, transmissions, differentials, ignition, starting, lighting, carburetion, etc. Our reputation for thoroughness is well known in the industry and our students are in demand everywhere. The leading manufacturers assisted in outlining our Course.



View showing part of the 25 motors in Block Test Department. All types are taught—2, 4, 6, 8 and 12-cylinder; sleeve-valve types, etc.

The Thoroughness of Our Course Opens Up New Opportunities for You.





Electrical Demonstration Department. All types of starting, lighting and ignition systems are mounted on frames, for intensive study.

Constant Demand For Trained Men

Every city, town and village wants trained automobile and tractor men. Factories are constantly asking us for graduates; owners in towns and villages want to know where they can find competent men to take care of their machines. We can't begin to supply the demand.

Big Factories Endorse Our School

All the big Auto Factories in Detroit and other cities heartily endorse and recommend our School. They give our students the fullest cooperation possible. Many of them assisted in outlining our Course. They know our methods and our equipment. They know the type of graduates we turn out. That is why they give our graduates the preference.



This is a section of the Brazing, Welding and Cutting Department. Each man handles the torches and works with an individual outfit.



Course Intensely Interesting

Actual machines to work on. Every standard type of car represented. Twenty-five different kinds of motors in our block test department. Our entire equipment best obtainable. No job too difficult when you complete our Course.

Complete Tractor Course Included

Complete instruction on the care and operation of Farm Tractors is a part of our regular Auto Course. The constantly increasing use of tractors has created a big demand for trained tractor men. Manufacturers place machines with us for the purpose of giving our students the benefit of practical instruction along these lines.

Brazing, Welding and Tire Repairing

Complete, separate courses are given on these subjects. Brazers and welders earn big money. Factories and garages always need competent men. Millions of tires in use afford wonderful field for repair men in shops or independent business.

Learn in Detroit—"The Heart of the Auto Industry"

You get the benefit of close contact with all the big factories. They furnish machines for our students to work on and give valuable assistance in many other ways. This enables our students to become intimately familiar with every car made. Our close relations with big factories make it possible to give our students the very latest ideas in the Auto Industry.

Not a One Man School



Our Course is not made up of one man's ideas. It represents the combined experience of many,—it consists of the latest, newest and most practical ideas of the biggest men in the auto, truck and tractor business. Our school enjoys the fullest cooperation with manufacturers, service stations, garages and owners,—a factor of vital importance to our students. A. G. Zeller, President.

Start Any Time

No need to waste a minute. Instruction can start same day you arrive. Three classes daily. School open all year. Instruction is complete and intensely interesting. Students given every possible assistance, both at school and after graduation.

Mail the Coupon

—and do it right now! Get our new big catalog. Tells the complete story—answers every possible question—shows actual photos of school, classes and equipment—quotes hundreds of letters from satisfied students. Or, better still, jump on train and come. Our Guarantee protects you. Be a live one and get action. Write—or come—today!

Money-Back Guarantee

We guarantee to qualify you for a position as chauffeur, repair man, tester, demonstrator, auto electrician, garage man, automobile dealer, Aeroplane motor mechanic or tractor mechanic and operator, paying from $75 to $300 monthly or refund your money.

SEND THIS COUPON TODAY

MICHIGAN STATE AUTO SCHOOL
7510 Auto Bldg., 687-89-91 Woodward
Detroit, Michigan, U. S. A.

Gentlemen: Please send me, absolutely FREE new 176-page Illustrated Catalog, "Auto School News," and information as checked below.

[ ] **Auto and Tractor Course**
[ ] **Tire Repairing**
[ ] **Brazing and Welding**

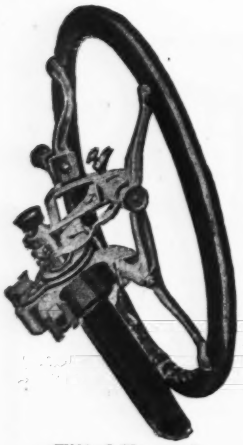
Mark each course you are interested in. Or, better still, you can expect me about

Name .....
Street .....
City ..... State.....

MICHIGAN STATE AUTO SCHOOL

"Most Progressive Auto School in America"—"In the Heart of the Auto Industry"

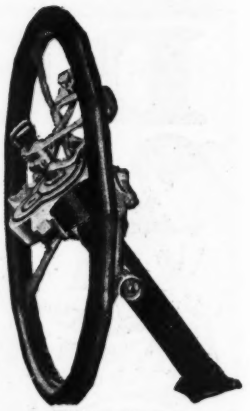
7610 Auto Building
687-89-91 Woodward Ave. **Detroit, Mich., U.S.A.**



Tilted Upward



Driving Position



Tilted Down

TILTS UP OR DOWN

"Tiltlok" tilts up or down to let the driver in and out—and

LOCKS THE CAR

"Tiltlok" is the steering wheel thousands of motorists have been waiting for. "Tiltlok" is the only tiltable, lockable, steering wheel made. Here, briefly, is what "Tiltlok" does for the automobile driver.

"Tiltlok" Tilts

—tilts up or down, allowing the driver of the car to get in or out of his machine without squeezing under the wheel. It gives a seven-inch clearance between the wheel and the seat.

"Tiltlok" Locks

The bushing, which is a part of the steering wheel, is stationary on the steering post. When the wheel is locked it spins on the bushing, making it impossible to drive the car.

It is easy enough to see the convenience of such a wheel. How many times have you, yourself, wished for a wheel that would tilt up or down as "Tiltlok" does?

How many times have you wished for a convenient lock for your machine—a reliable lock—a simple lock—a burglar-proof lock?

"Tiltlok" fits all cars. Furnished in 17 and 18 inch sizes, with a maple and walnut rim, claw and inserted type, black enamel finish. "Tiltlok" walnut rim, inserted, sheraridized finish, $29—maple walnut rim, black enamel finish, claw, $24.50. Prices f.o.b. Detroit. Two Ford models, also.

We have a big opportunity to offer dealers. Write our nearest distributor—and for other territories than those mentioned below, address us.

Detroit Steering Wheel Corp.

979 Woodward Ave. Detroit

BRANCH DISTRIBUTORS

Chas. S. Smith, Inc.,
1220 Race St.,
Philadelphia, Pa.

R. L. Hanrahan,
1256 S. Michigan Ave.,
Chicago, Ill.

Warner Hardware Co.,
13-17 S. 6th St.,
Minneapolis, Minn.

Kummer & Reynolds,
955 Woodward Ave.,
Detroit, Mich.

F. F. Cushman,
Rhode Island

S. N. Sutter,
6525 Euclid Ave.,
Cleveland, O.

V. D. Schaar, Orion, Mich.

Detroit Steering Wheel Sales Co.,
157 Mason St.,
Milwaukee, Wisc.

L. G. Tanberg,
Springfield, Ill.

TILTLOK



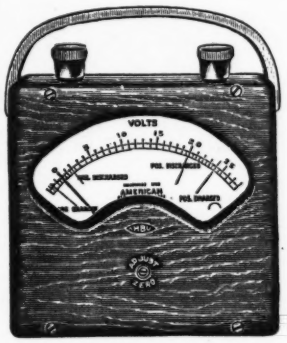
STEERING WHEELS

FOR ALL MAKES OF AUTOMOBILES

AMBU BATTERY SHOP NECESSITIES GO HAND IN HAND WITH INCREASED PRODUCTION AND GREATER PROFITS

KNOW WHICH SET OF PLATES ARE IN BAD CONDITION WITHOUT OPENING BATTERY

AMBU CADMIUM VOLTMETER AND LEADS TELL YOU QUICKLY



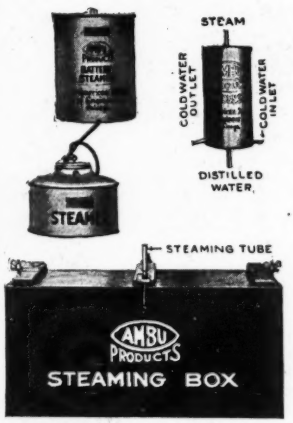
Ambu Cadmium Leads are two heavily insulated flexible wires with brass prods and wooden handles, and forked terminals for attaching to the voltmeter. Fastened at right angles to one of the brass prods is a rod of chemically pure cadmium. With them you have the means to make tests in finding out which set of battery plates is functioning properly and whether they are positive or negative plates. No Battery should be sent out of your shop until a Cadmium Test shows that both positive and negative plates are fully charged and ready to give good service.

In order to make accurate Cadmium Tests you must have a fine reading Voltmeter.

The AMBU CADMIUM VOLTMETER is made especially for Cadmium Tests, and is, therefore, absolutely certain to give you accurate results. A complete instruction book for making Cadmium Tests goes with each instrument.



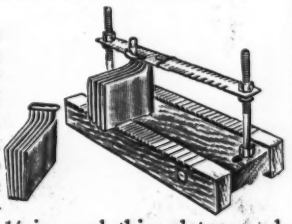
Voltmeter with Cadmium Leads **$25.00**
Voltmeter, only **22.50**
Cadmium Leads, only **3.25**



AMBU BATTERY STEAMER

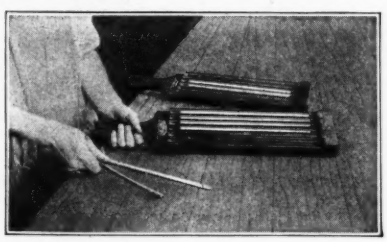
Softens the sealing compound in a few minutes so that it can be easily removed. Works while you are busy elsewhere. No chance to burn the battery top cover as with a flame. Supplied either with or without condenser for making distilled water for batteries. Complete with condenser $35.00. Without condenser $25.00. Condenser alone $12.50.

AMBU PLATE BURNING RACKS



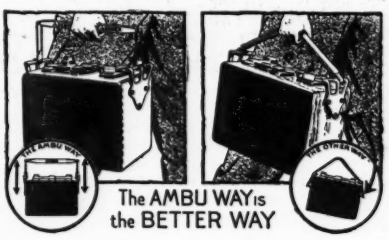
Holds plates at exactly right spacing and absolutely upright when burning in new ones or attaching new strap. Saves half the time of any other method. Attachments fit around plate, lugs permit puddling lead. No iron touches the bottom of the plates. Made in two sizes—smaller one takes two groups—⅛-in. and thin plates—and large size takes 95% of all types, including the two sizes cared for in the small rack. Every shop needs these. Small size $7.50. Large size $12.50.

AMBU BURNING LEAD MOULD



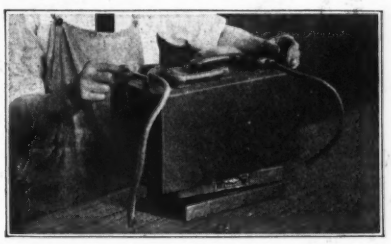
In every shop there is an accumulation of scrap lead from old plates, post drillings, etc. Save this scrap and use it in lead burning. The Ambu Lead Mould gives a very handy sized burning lead, absolutely free from air holes.
Price, each $1.50
Price, per pair 2.50

AMBU BATTERY CARRIER



Enables you to carry a battery like a suitcase, with the least strain on your arms. One man can carry two batteries at once, one in each hand. Also useful in lifting battery in and out of the car.
Price each $1.50
Price, per pair 2.50

AMBU BATTERY TURNTABLE



Nobody moves a battery around unnecessarily on account of its great weight. Yet, in lead burning, sealing and repairing or painting the case, it is necessary to get at all sides of the battery. The Ambu Turntable enables the repairman to get at all sides of a battery when making repairs and eliminates the tiresome lifting and turning by hand.
Price, each $2.50

Other Ambu Battery Shop Appliances upon request

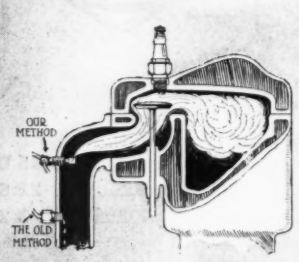
Order from Your Jobber or Direct
APPLIANCE DIVISION
AMERICAN BUREAU OF ENGINEERING
1605 S. Michigan Avenue
Chicago, Ill., U. S. A.
Makers of the Famous AMBU TROUBLE SHOOTER

Write for List of Ambu Books

JORGENSEN VAPOR PRIMERS

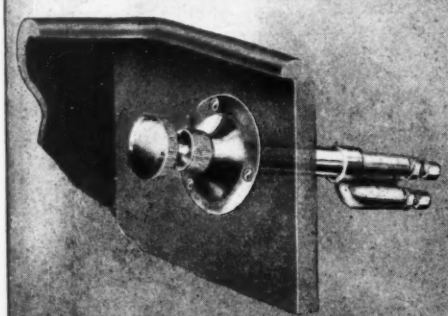
for Passenger Cars - Trucks - Tractors

The only primer that vaporizes the starting charge, and does it so thoroughly that motors positively start on second compression stroke on coldest mornings.



Installation of Jorgensen Vapor Primer

The JORGENSEN Vapor Primer never fails. It injects the vaporized starting charge into the combustion chamber—right where the spark ignites it.

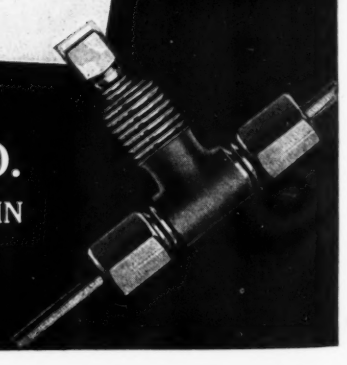


Style Straight, No. A4

Insist on the JORGENSEN Vapor Primer. It is the primer money maker. Sells for $5—*and it sells.* Special for Fords, $4.50.

DEALERS AND JOBBERS WRITE

DEALERS ORDER FROM YOUR JOBBER



JORGENSEN MANUFACTURING CO.

WAUPACA WISCONSIN

KELLOGG Combination GREASE & OIL GUN

for Passenger Car or Truck

Built as Well as Kellogg Knows How.



THE powerful suction stroke of this self-loading Kellogg serves to completely fill its barrel.

Ejects light oil like any ordinary gun. A powerful cut rack and pinion movement gives the necessary leverage to handle heavy grease with equal ease and speed.

Convenient for obtaining gas from tank for priming, cleaning, cold patches, etc.

Large and coarse threading in cap and barrel prevents crossing and stripping.

Six inch, detachable, curved oil and grease spouts reach inaccessible places.

A favorite in the tool box of the better equipt cars.

Character reference: Kellogg's Engine Driven Tire Pumps.

Length of barrel 8¼ inches. Diameter 1⅝ inches. Steel Cylinder, brass finish. Capacity 8 ounces.

Price $2.50

KELLOGG MANUFACTURING CO.

Rochester, New York

Things Savage Axles do not do

② Transmit power- around a corner

Under all conditions - from no load to full load - Savage Axles provide practically straight line drive. Angles at the universal joints are so minimized that they are practically eliminated leaving just a straight line power transmitting shaft that permits all of the motor-generated power to be delivered



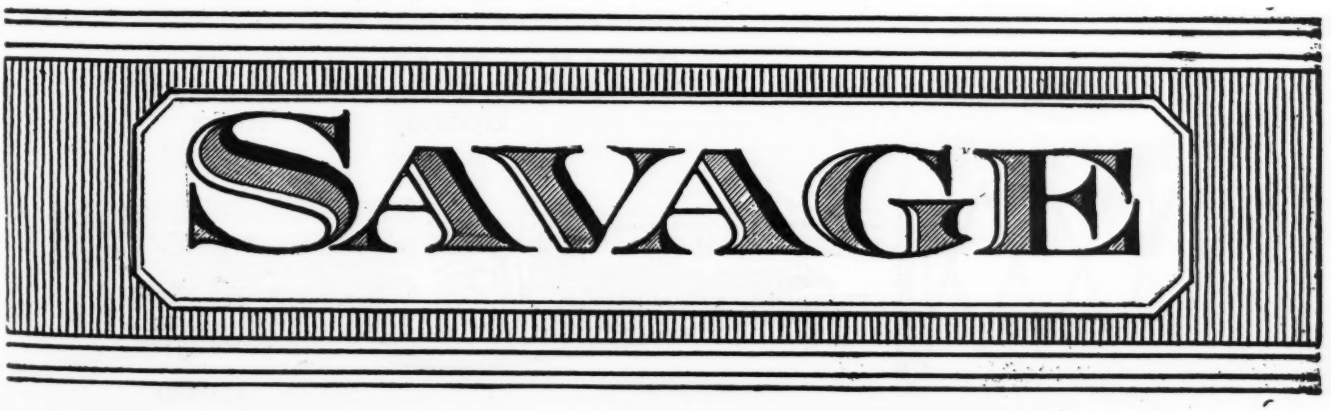


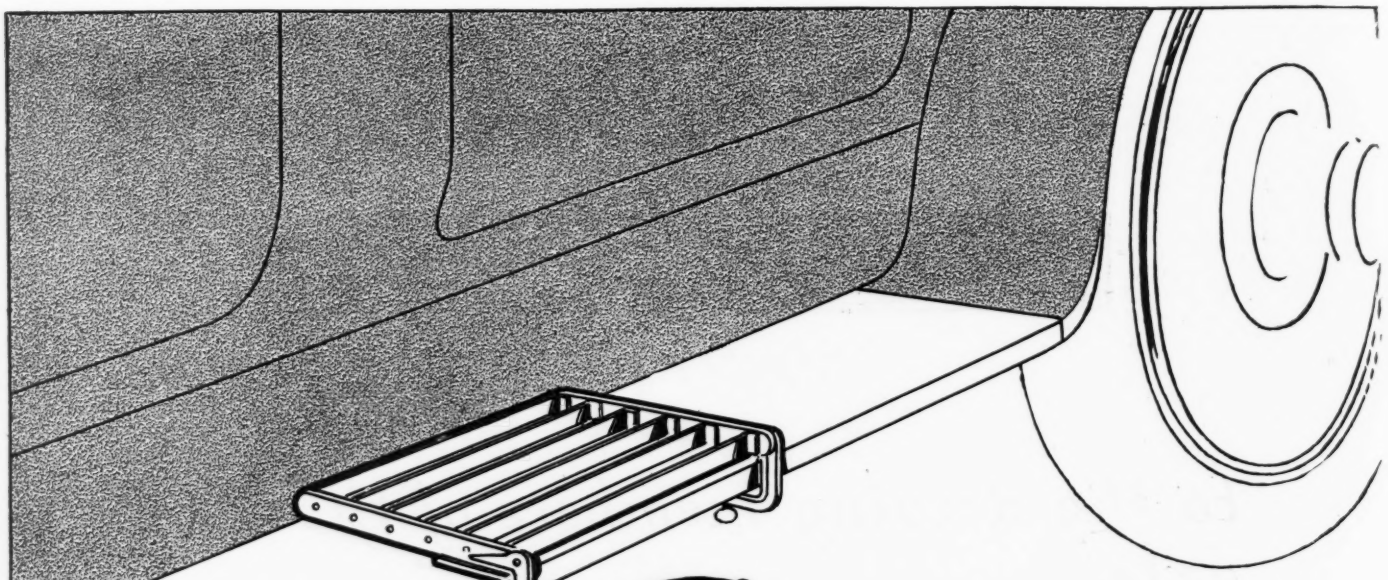
to the driving members of the axle.

Transmitting power around the corner through a universal joint running at an angle—is expensive waste

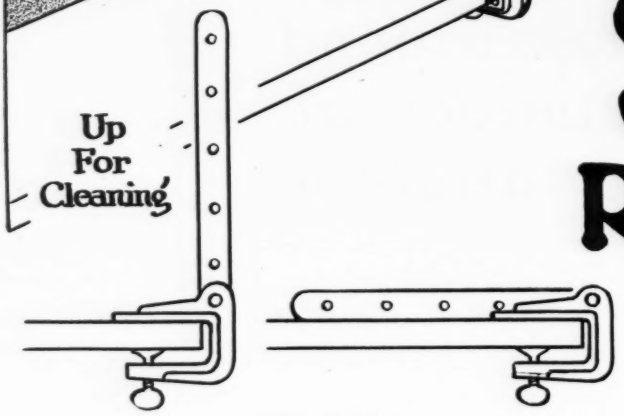
SAVAGE ARMS CORPORATION
SHARON, PA.
UTICA NEW YORK DETROIT PHILADELPHIA

This is No. 2 of the things Savage Axles do not do





Standley Running Board Step



TOP VIEW

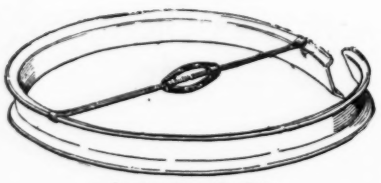
DEALERS—STOCK UP ON A PROFITABLE LINE OF WINTER ACCESSORIES

As car sales decline in winter, dealers will have to look to a new source for their steady revenue. The Standley Running Board Step is a good start in this direction. This new running board step is attached with clamps,, and is made of steel 1/16" x⅛". It is finished in black enamel, and has a splendid appearance.

The Standley has many advantages over the coco mat, due to the fact that it has everlasting life, and can be raised up from the running board for cleaning.

STANDLEY RIM TOOL

This is the most simple rim tool on the market, and can be operated easily with the hand, enabling any one to remove a tire in a moment.



Contracting the Rim



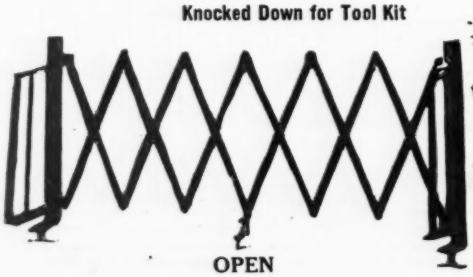
Knocked Down for Tool Kit

STANDLEY ADJUSTABLE LUGGAGE CARRIER

This compact folding carrier provides an ideal method for carrying excess baggage. When not in use, it can be folded up and placed under the seat. Adjustable from 10 to 44 inches.

Standley Skid Chain Company

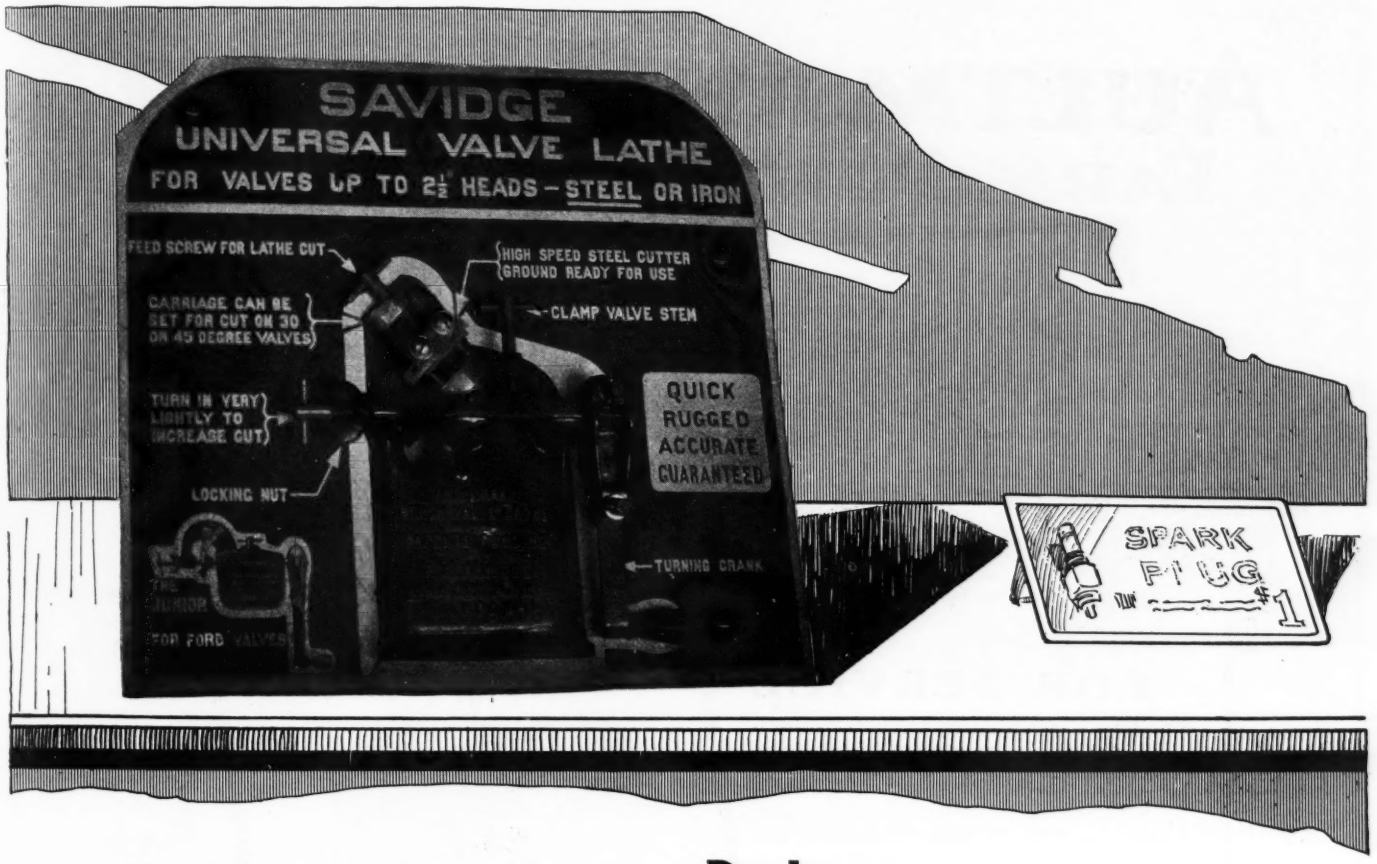
Boone, Iowa



OPEN

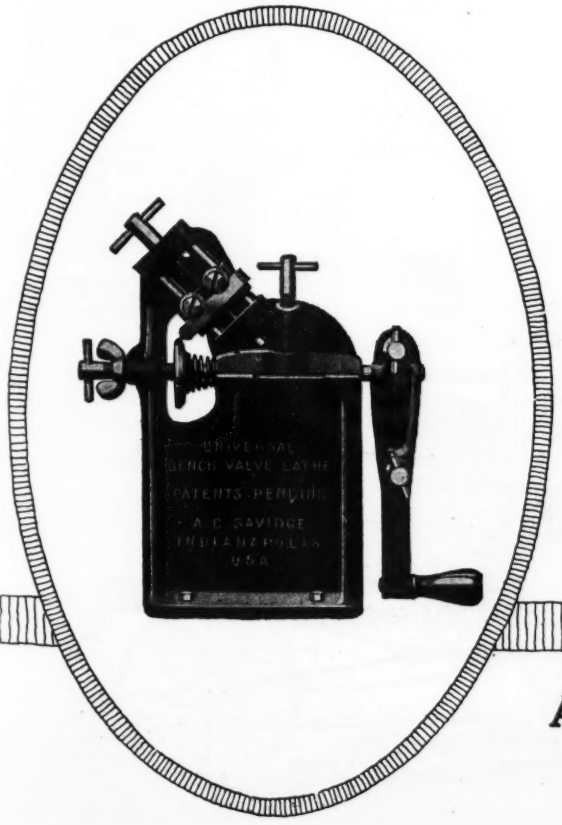


CLOSED



Unconditional Guarantee

The SAVIDGE UNIVERSAL BENCH VALVE LATHE is guaranteed unconditionally for one year from date of purchase.



Dealers—

Ask Your Jobber to Show You the Savidge Universal Bench Valve Lathe.

This wonderful, simple and accurate machine is well worth your attention. It does in a few minutes the work which it takes hours to do by other methods. The SAVIDGE UNIVERSAL will true the hardest tungsten or cast iron valves. There is no need for an expert machinist to operate it—any individual can do the highest class job easily and quickly. The UNIVERSAL has a real machine lathe action and is an essential piece of equipment for private car and truck owners, small and large garages, or service stations, with or without machine lathes.

JOBBERS

The new SAVIDGE counter display stand will stimulate exceptional interest.

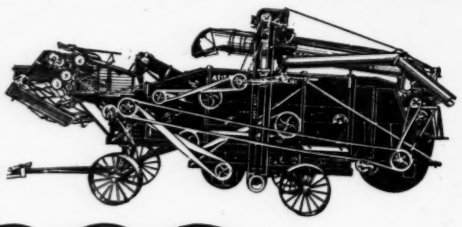
DEALERS

Your jobber can supply you.

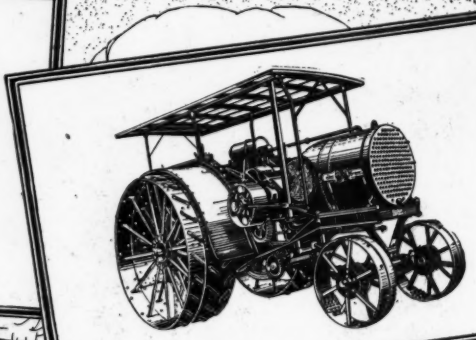
A. C. Savidge Co.
No. 1 Williams Bldg.
Indianapolis, Ind.

SAVIDGE UNIVERSAL Bench Valve Lathe

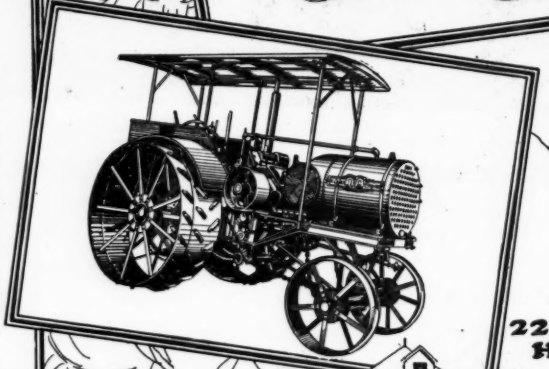
AULTMAN-TAYLOR
FARM-POWER MACHINERY



NEW CENTURY
4 SIZES
2 Small Sizes for Individual Use



30-60 H.P.



22-45 H.P.

—FOR SERVICE

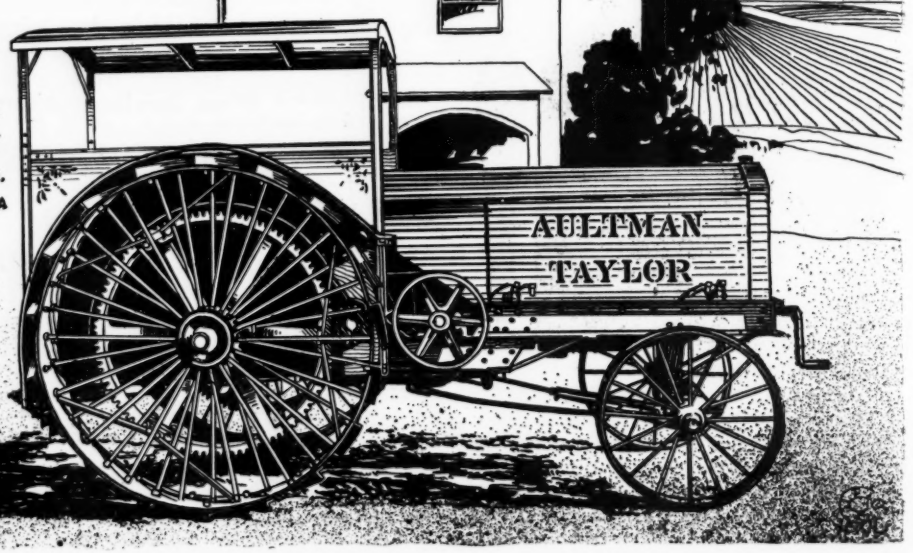
THERE are a dozen or more big outstanding characteristics that, from the start, either advocate or depreciate a tractor. Of these, the one most vital feature is simplicity. For simplicity without sacrifice of good engineering and rugged construction means *service.*

Aultman-Taylor Tractors are built in three sizes, the powerful 30-60, the 22-45 and the famous all-purpose tractor, the Aultman-Taylor 15-30.

No one knows the limit of these tractors' service. All tests so far, field contests and all-year-'round usage on thousands of farms—have failed to reveal a single point of weakness in design, materials or workmanship.

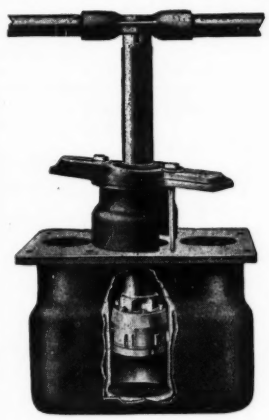
Aultman-Taylor service stands unique in tractor history. A known, reliable firm with fifty years' experience in building farm machinery of the very highest quality—it is logical that we appreciate the farmer's primary need for *service,* and give it.

In view of the demand we suggest early application for territory.

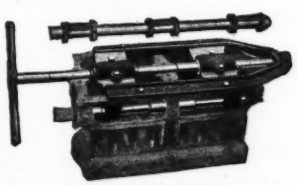


The AULTMAN & TAYLOR MACHINERY COMPANY
MANSFIELD OHIO.
CANADIAN BRANCHES: CALGARY & REGINA

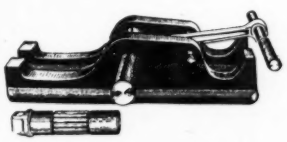




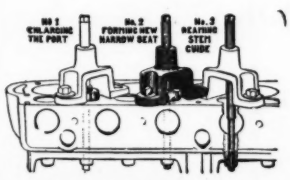
Cylinder Reboring Machine



Main Bearing Babbitting and Boring Tool



Connnecting Rod Bearing Reamer and Straightening Gauge



Valve Port Renewer

YOUR Business Harvest really depends on your personal efforts. If you are not equipped to do all the repair work your customers bring you, you will reap only a LEAN HARVEST.

Just as it takes **Rain and Snow Storms** to insure good crops, just so it takes **STORM tools** to turn out the **best of work.**

To do the good work you must have tools that are especially designed to handle the particular jobs you get.

Storm Tools are standard equipment in garages everywhere.

STORM TOOLS INCLUDE

Cylinder Reboring Machines
Piston Vises
Burning-in Stands
Valve Port Renewers
Main Bearing Babbitting and Boring Tools
Connecting Rod Bearing Reamer and Straightening Gauges

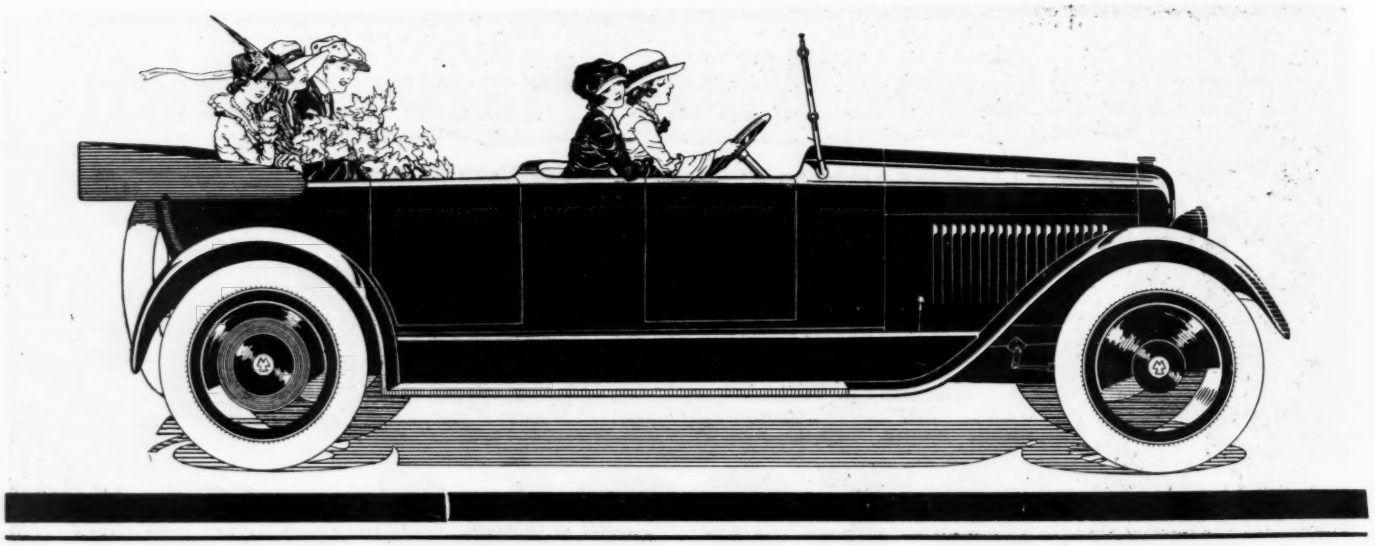
Garages that use the STORM tools find their shops cramped with business, thus proving that **Storm tool users always reap a good business harvest.**

There is a STORM product to supply your needs.

Descriptive literature on request. Ask for Bulletin A-42

STORM MFG. CO.

406 Sixth Ave. South **Minneapolis, Minn.**



World's Champion Light Six

The Elgin Six has won this great title by virtue of its repeated triumphs in every conceivable kind of endurance and economy contest held during the past four years.

The Elgin has distinguished itself most notably throughout the trade as the absolute leader in the Light Six field.

Its increasing popularity is founded on merit alone—and is not restricted to any one particular class of buyers.

Folks who might well afford higher priced cars buy Elgins—for the Elgin instantly commands the respect and admiration of the most discriminating.

Where moderate means might have tempted other folks to invest in cheaper cars, Elgins have been bought instead—for it is known that economy in the long run is more essential than an initial saving.

As to its appearance—the inviting character of its design and the alluring beauty of its body finish—it enjoys the distinction of having set rather than catered to vogue.

There is no car—at any price—more beautiful.

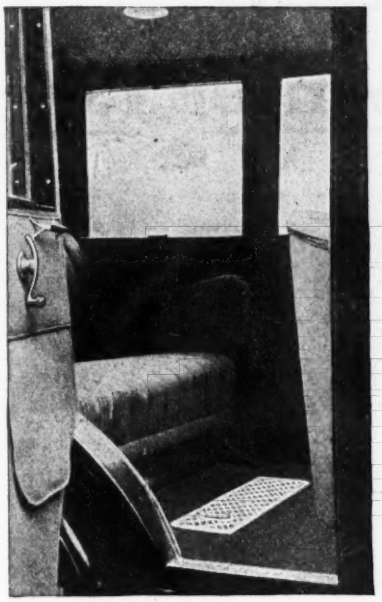
ELGIN MOTOR CAR CORPORATION

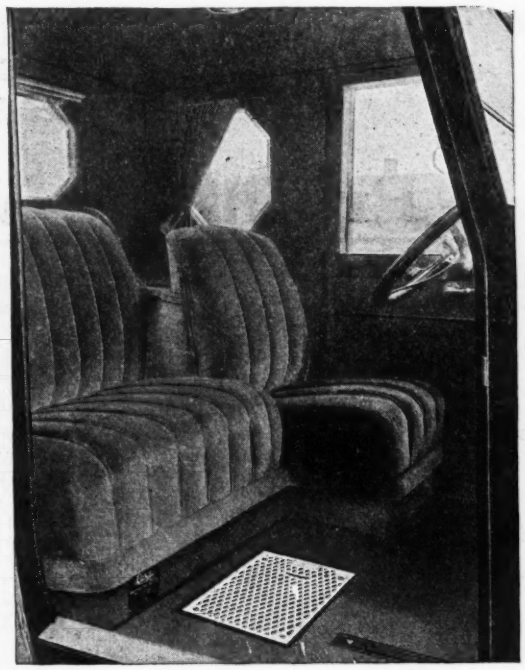
Argo, Illinois
(Suburb of Chicago)

Our schedule of increased production enables us to offer some very excellent territory for development. Responsible dealers are invited to communicate with us at once in regard to securing the Elgin franchise. Address Department S.

The beautiful Elgin Six Portfolio, illustrating all models, will be mailed upon request.

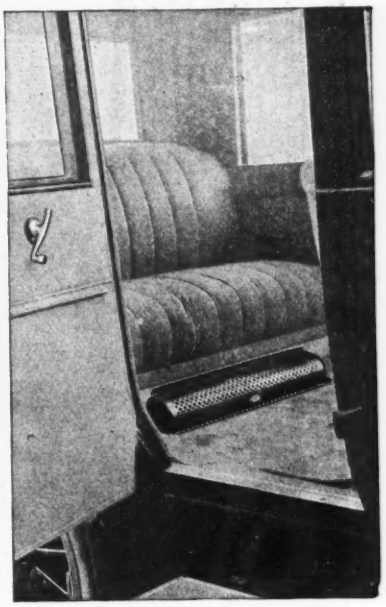
Type "G" Heater Installed in Sedan





Type "A" Heater Installed in Coupe

Type "DWS" Heater Isntalled in Sedan



Cars Using PERFECTION MOTOR CAR HEATERS as Standard Equipment on one or more models.

Allen
Case
Cole Aero-Eight (all models)
Crow-Elkhart
Grant
Haynes
Hudson
Kissel
King
Liberty
Maibohm
Mitchell
Moon
National
Northway Motors Corp. (truck cabs)
Oakland
Oldsmobile
Paige
Premier
Roamer
Scripps-Booth
Stephens Salient Six
Templar
Velie
Wescott
Willys-Knight
Yellow Taxicabs of Chicago.

A Big Demand for Warm Cars in Winter

Perfection Motor Car Heaters fill the demand of motorists for cars made Comfortable in Winter.

Absolutely no gas or odors come in contact with the air breathed and a greater mileage per gallon of gas is possible.

Cars not already equipped with Perfection Motor Car Heaters offer a big market to Perfection distributors and dealers. There is a type of heater for every make or model of car—carefully designed and made of high grade materials.

Because it is used throughout the entire year, the Perfection heated motor car is an asset to both manufacturer and dealer.

Attractive territory now open. Write for descriptive literature and terms.

The Perfection Heater & Mfg. Co.

6545 Carnegie Avenue **Cleveland, Ohio**

PERFECTION MOTOR CAR HEATERS PATENTED



GORDON
JACK FROST ENGINE ROBES
TAILORED TO FIT

A Profitable Winter Item

Gordon Jack Frost Engine Robes are an extremely profitable item of motor equipment. By pushing them intensively now, you can secure the most desirable engine robe business in your community. We gladly supply you with attractive sales helps.

Like all Gordon products Jack Frost Engine Robes are made according to the rigid Gordon standards. Only the best heat retaining materials, which effectively keep the warm air in and the cold air out, go into their making. They fit snugly over the hood of the car and being made in two pieces allow the hood to be opened without removing the robe. The radiator curtain is adjustable to every weather condition.

Write for our new general catalog No. 160, giving complete prices and discounts for all makes of cars.

GORDON
JIFFY CUSHION SLIPS
YOU CAN WASH 'EM

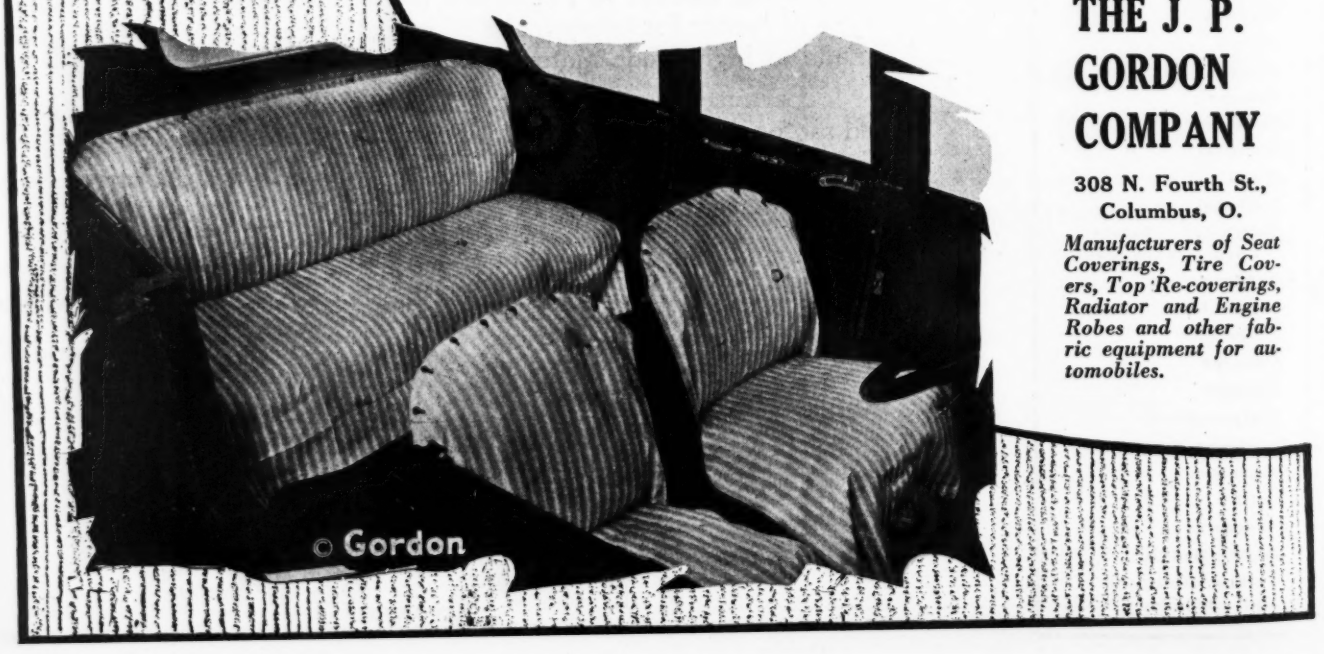
An All-Year Low-Priced Seat Covering

Gordon Jiffy Cushion Slips are made for year around use—for both open and enclosed cars. You can, by continued effort now, make them a profitable year 'round item of your business.

For Gordon Jiffy Cushion Slips have met a universal need. They are inexpensive, easy to put on or take off, washable and it is necessary for you to stock only twelve sizes, as they are standardized to dress 95% of American made cars.

They not only improve the appearance of the car, but by effectively covering the seats and backs, prevent the soiling of dainty wearing apparel by grimy auto cushions.

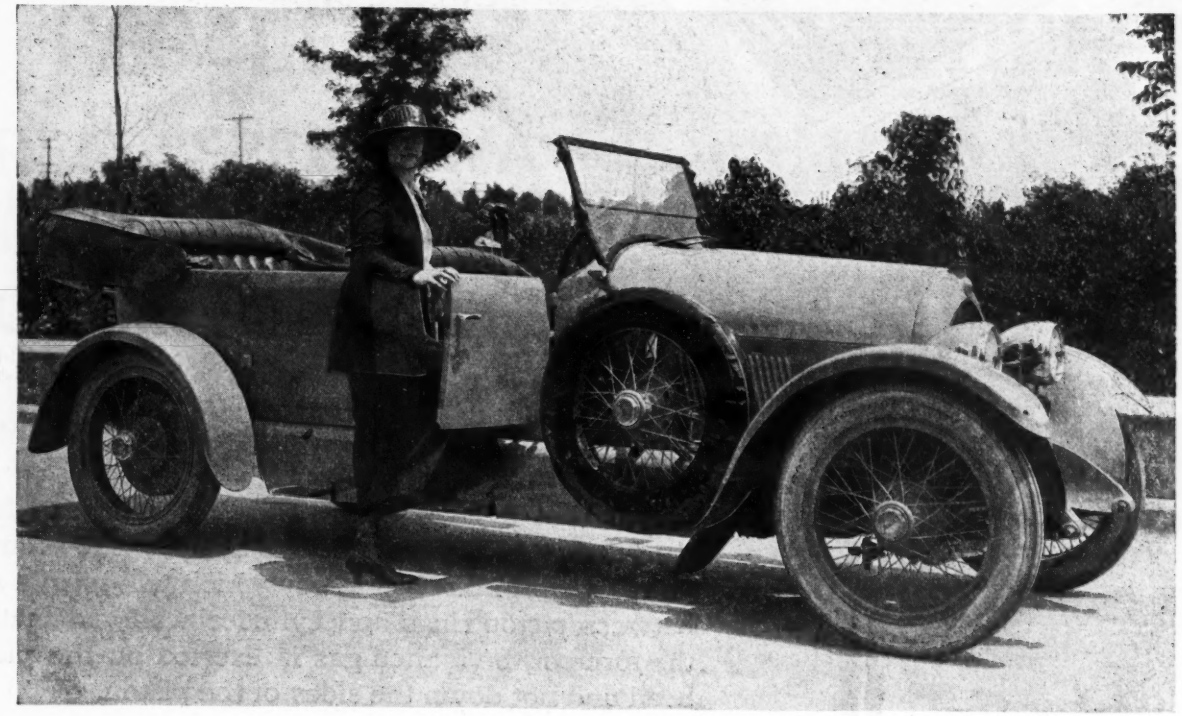
Each box contains photographic instructions for putting them on. There is no fussing or fitting for you to do. The customer can put them on himself. Write for our new catalogue, samples and complete dealer proposition.



THE J. P. GORDON COMPANY

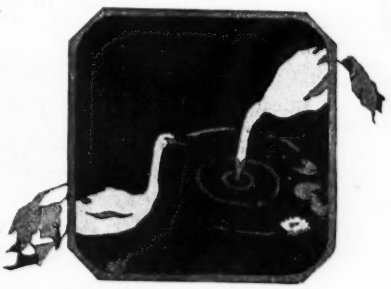
308 N. Fourth St.,
Columbus, O.

Manufacturers of Seat Coverings, Tire Covers, Top Re-coverings, Radiator and Engine Robes and other fabric equipment for automobiles.



THE NEW REVERE

America's Incomparable Car



Duesenberg racing type motors used in all Revere cars. Visit the Automobile Salon at the Commodore Hotel, New York City, November 16th to 23rd. Speed 80 to 85 miles an hour.

Address

REVERE MOTOR CAR CORPORATION,
Logansport, Indiana.

Catalogue and Specifications on Application

REVERE MOTOR CAR CORPORATION, LOGANSPORT, IND.



Heat does not break Havoline Oil

That is one great essential in any motor lubricant, and it is the outstanding feature of Havoline Oil.

The hot cylinder walls must be protected from the friction of plunging pistons by a constant film of oil. That oil must have body which will form a seal between piston rings and cylinder walls so that all the force of the ignited gas is exerted on the piston head and not down the sides of the piston.

HAVOLINE OIL

REG. U.S. PAT. OFF.

"It makes a difference"

COPYRIGHT

So carefully is Havoline Oil refined and classed, there is a grade of Havoline that exactly fits the requirements of your passenger car, truck, or tractor.

Havoline comes in sealed blue cans of convenient sizes, and also in barrels.

Your dealer will know just the grade and quantity you need, and can supply you.

Havoline greases are compounded of Havoline Oil and pure, sweet tallow. Clean to handle and correct in body.

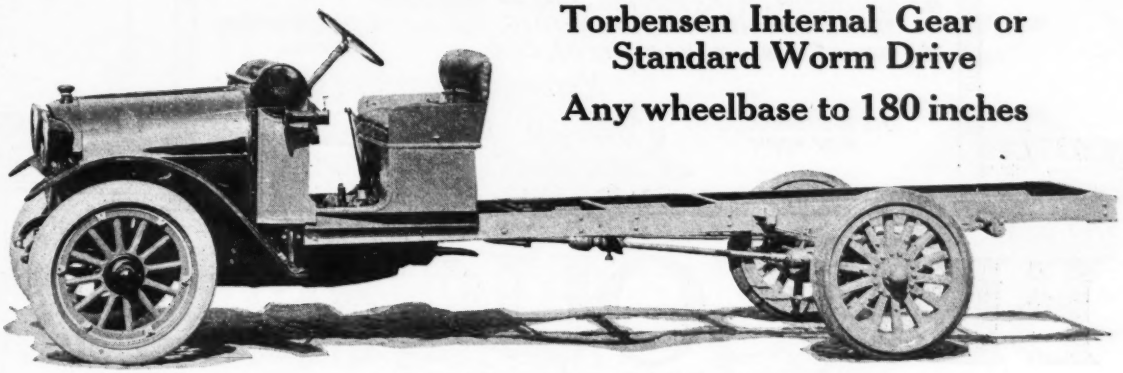
INDIAN REFINING COMPANY, NEW YORK
INCORPORATED
Producers and Refiners of Petroleum

REO DEALERS—ATTENTION

REO "SPEED WAGONS" MADE INTO 2 AND 3-TON TRUCKS WITH E. & W. TRUCK UNITS

Torbensen Internal Gear or Standard Worm Drive

Any wheelbase to 180 inches



156 inch wheelbase—10 foot loading space
(2 feet of E. & W. frame was cut off this job)

Reo "Speed Wagons" are well adapted for converting into heavy duty trucks of two to three ton capacity with E. & W. Truck Units.

E. & W. Truck Units are furnished with choice of Torbensen Internal Gear or Standard Worm Drive axles and any size solid or pneumatic cord truck tires, furnishing a heavy duty truck for any purpose.

Write for Our Dealers' Proposition.

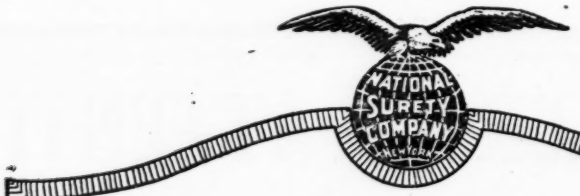


Aeroplane view of E. and W. 2 ton Reo truck—two short propeller shafts with three universal joints and center hanger eliminate all propeller shaft trouble.

E. & W. Truck Units Will Make a Truck of Any Car

E. & W. MANUFACTURING CO., Oregon & Hanover Sts.

MILWAUKEE, WISCONSIN



FOR VALUE RECEIVED the NATIONAL SURETY COMPANY, duly authorized to transact business in every state of the United States of America and the Republic of Mexico and Dominion of Canada, hereby guarantees full compliance by BERGOUGNAN RUBBER CORPORATION with its guarantee as expressed on the reverse side of this card.

This guarantee extends only to tires purchased during the period ending December 31, 1920.

NATIONAL SURETY COMPANY.

115 BROADWAY
NEW YORK

PRESIDENT

BERGOUGNAN

BEAR-GOO-NIAN

"GIVE ME FORTY DOLLARS WORTH OF MILEAGE"

The tire user does not buy rubber, he buys **miles.**

If you can convince him that he will get the mileage he pays for, the sale is made.

In selling him BERGOUGNAN tires the convincing process is easy. All you have to do is point out to him: first, that the manufacturer guarantees the fabric tires for 6,000 miles and the cord tires for 8,000, and, second, THAT THE NATIONAL SURETY COMPANY GUARANTEES THAT THE MANUFACTURER WILL COMPLY WITH THIS MILEAGE AGREEMENT.

There is absolutely no room left for argument. If the Bergougnan Rubber Corporation does not make good on its promises, the National Surety Co. will.

A certificate to that effect, signed by the President of the National Surety goes with each Bergougnan tire sold.

This certainly ought to make it easy for you to sell BERGOUGNAN tires. Write for terms and territory.

Bergougnan Rubber Corporation

Trenton, N. J.

New York	Philadelphia	Montreal
49 West 64th St.	1404 West Girard Ave.	325 St. James St.



TO ADJUST:

Lift jaw, slide to desired size and drop into mesh. Takes only an instant to get any one of nine sizes.

No Knurl Adjustment
No Back Lash

Why Is The Wrench You Need Always at the Bottom of the Tool Box?

Like all of life's mysteries, it cannot be explained. But temper-testing searches for the right-sized wrench can be avoided by slipping a Wizard in your tool box.

This five-in-one wrench is instantly adjustable to any one of nine sizes and not only replaces five ordinary open-end wrenches but is superior to any in sturdiness and balance, besides eliminating back lash which is inherent in all other wrenches.



Length 7¾ in.
Thickness ⅜ in.
Width 2⅛ in.
22½° angle

Patents pending in U. S. and Foreign Countries

From the "30 years famous" Wakefield Line of Quality Wrenches.

A Wizard Takes the Place of Five Ordinary Wrenches

Instantly adjustable to nine sizes:

¼ in., 5/16 in., ⅜ in., 7/16 in., ½ in., 19/32 in., 11/16 in., 25/32 in., ⅞ in.

9 U. S. Standard Sizes
4 S. A. E. Standard Sizes
6 U. S. Standard Cap Screw Sizes
4 Set Screw Sizes

A WAKEFIELD PRODUCT

WAKEFIELD WIZARD WRENCH
ADJUSTABLE OPEN END

Dealers—Here is one of those rare articles that sell on sight to every car owner and garage man. The wonder wrench and from the old reliable Wakefield line. Write TODAY for our proposition.

C. E. WAKEFIELD WRENCH MANUFACTURERS FOR OVER THIRTY YEARS **WORCESTER, MASS., U. S. A.**

Giving the World Its Own Six

ONLY the resources of a great institution could give the World a Six cylinder car *for the thousands.*

Automobile engineering had to be pulled out of its rut; new principles discovered, tested and proven—and above all, *quantity production made possible.*

The Alps had to be crossed.

And yet, for years, thousands upon thousands of people had been waiting, doubting, hoping for just such a car.

The Willys Corporation knew its own fitness for the task.

Here was an association of great industries—big, because big problems had been solved and great needs supplied:

—The Electric Auto-Lite, occupying extensive factories at Toledo, O., and Poughkeepsie, N. Y.; standard equipment on twice as many automobiles as that of any other lighting and starting system; with orders on hand demanding a production of 4,000 sets per day throughout 1920:

—The Willys Light, supplying private electric lighting systems for thousands of farms and country homes:

—The New Process Gears, employing over 2,000 skilled workers at its Syracuse, N. Y. plant—one of the foremost producers of gears for automobile trucks and tractors in the automotive industry.

The Corporation is also heavily interested in other big concerns contributing to the automotive industry.

The new Six added another great industry to the group and demanded a great plant of its own. The plant of the Duesenberg Motors Company at Elizabeth, N. J. —formed a nucleus. • Its capacity had been doubled to build war-motors. It was purchased, and, its war-capacity is being increased many fold.

Here, or at other plants controlled by and closely allied to the Willys Corporation, practically every item entering into the building of the Six—from raw material to finished product—will be produced.

The new plant, when completed, will have a capacity of 400 to 500 completed Sixes per day.

And a wonderful achievement the new Six is—a small car, 112 inch wheel base, with new economies for even that class, yet with all the roadability and comfort of the luxurious extravagant cars with *30 inches larger wheel-base,* The radically new principle of spring suspension accounts for much of this.

Other new principles reduce the weight of the car —to approximately 2,100 pounds.

New efficiencies are developed in the engine. The car has averaged 17 to 20 miles to the gallon of gasoline for over 200,000 miles of usage. Every feature has had 2 years of proving —200,000 miles, from boulevards to boulders.

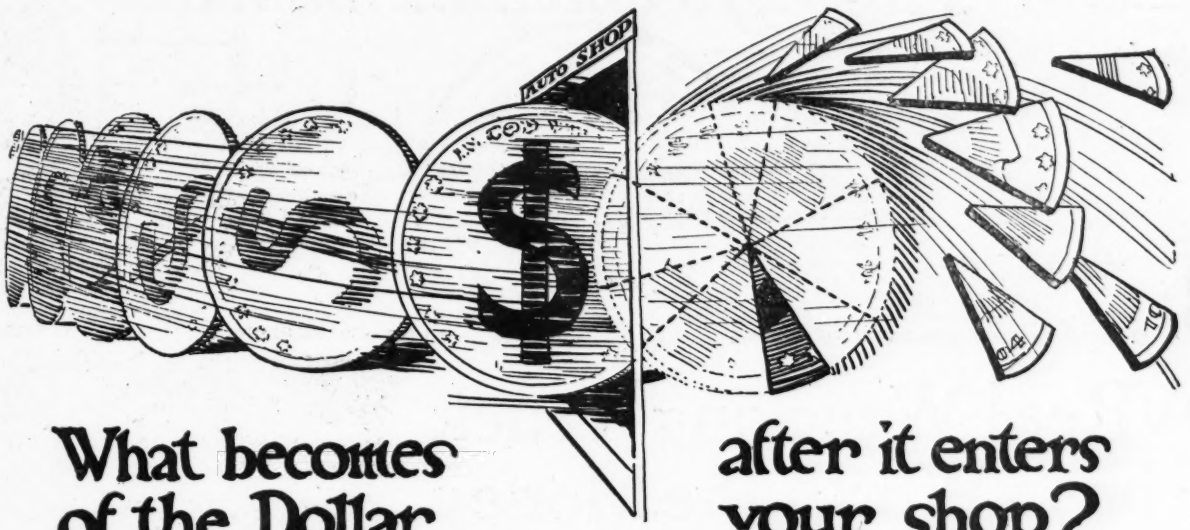
A car for the eye as well as the purse—Pride of Ownership Stamped All Over It.

Anyone desiring further information about the plans and car program of the Willys Corporation should write for our booklet.

Willys Corporation

52 Vanderbilt Avenue, New York

N. B.—*This is one of a series of advertisements to acquaint the public, automobile trade and buyers of motor cars in general with the present scope and important plans of The Willys Corporation.*



What becomes of the Dollar after it enters your shop?

That's a vital problem for every automobile dealer, repair shop and garage. While it is important to get the dollars into the shop; every dollar that enters is immediately split into many parts. There's general overhead, rent, light, office expense, and labor and material. At the very best only a small part of each dollar is left for profit.

And it doesn't take much of a slip to cut that profit part of the dollar in half—or have it disappear altogether.

But you can buy insurance on every dollar that comes into your shop—insurance that will protect the profit part of the dollar.

The very best insurance to protect profit is knowledge of your business—knowledge of every part of your business and knowledge of what every part of your business costs.

Know your costs and profits will take care of themselves.

But because every dollar breaks into parts and every part goes in a separate direction, you must have complete knowledge in order to save profits.

There are more than thirty different forms in our catalog.

And every single tag or form was produced to meet an actual need.

Not in your business, or any single business, would all thirty of these forms be necessary.

But you do need enough of these forms to give you a record of every piece of every dollar that enters your shop.

You must know what you charge for each item—what it costs you—how many different items enter into each job.

You must know what each man does—how much he costs you—whether or not he is producing a profit.

You must know what stock you bought—what you sold that stock for—what stock you have on hand.

Use enough of the Comfort Standardized Tags and Forms to give you complete knowledge of your business.

Get a copy of our catalog, every form is illustrated, described and its use explained. Go over the catalog page by page, carefully note how many of these forms you can use to advantage—every additional form that you can use means additional insurance on your profits. Send for catalog today. Just sign your name on the coupon.

COMFORT
ST. LOUIS

COMFORT STANDARDIZED TAGS AND FORMS
FOR DEALERS, GARAGES AND REPAIR SHOPS
GIVE ACCURATE COST DATA ON EVERY JOB

Comfort Printing Specialty Co., 101 N. 8th Street, St. Louis, Mo.

REQUEST FOR CATALOG
COMFORT PRINTING SPECIALTY CO.,
101 North Eighth Street, St. Louis, Mo.
Please send me catalog of the Comfort Standardized
Automobile Tags and Forms.

Name.....
Street.....
Town.....
State.....



A Real Wrecking Truck That's Worth the Money



Like every other item of shop equipment that bears the "Continental" name, it's a high-grade, quality article—the best you can buy.

There are plenty of cheap wrecking trucks on the market but only one that embodies all the good points of such a truck as you yourself would build. The "Continental" is strictly in a class by itself.

It is equipped with 1⅜ inch chrome nickel steel axles and Hyatt Roller bearings—encased in a dust proof housing. Built for rough and ready service—a device that will last for years.

Model R has 3 inch solid rubber tires while the wheels of the Model S are of steel. Wheels are 3 inches wide and 16 inches in diameter. In all other respects the trucks are the same.

A patented saddle fits the differential housing with provision for fastening it firmly by throwing a rope or chain over the rear axle.

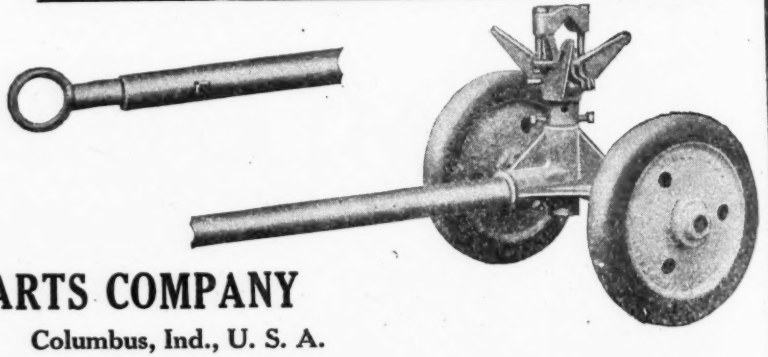
A clamp is provided for attaching the same saddle to the front axle, making it unnecessary to carry numerous attachments for jacking up the car.

The "Continental" Line

Motor Stands	Garage Jacks
Axle Stands	Industrial Trucks
Ford Engine Stands	Wrecking Trucks
Battery Stands	Hoists
Radiator Stands	Bushing Presses
Assembly Tables	Crank Shaft Straightening Presses
Welding Tables	Cam Shaft Straightening Presses
Creepers	Spring Spreaders

CATALOGS ON REQUEST

The illustrations show the Model R with rubber wheels. Our literature has illustrations and full specifications which prove the superior quality of this truck. Write for your copy or place your order with your jobber for immediate delivery.



CONTINENTAL AUTO PARTS COMPANY

1803 E. 17th St., Columbus, Ind., U. S. A.

Continental Shop Equipment



THIS ILLUSTRATION shows 57 fan belts of different types and makes after being tested by a prominent car manufacturer. (Name on request.)

Almost every kind and type of belt obtainable was represented in this test.

As is usual in all comparative tests of this kind, only one belt—GILMER—stood up without developing a single flaw or fault.

Similar tests conducted by other manufacturers explain why 8 out of 10 cars built today are equipped with GILMER Woven Endless Fan Belts.

The Car Manufacturer Knows

MANY a car owner buys a fan belt on faith—on the way it looks or feels—and is never the wiser, until it gives out suddenly.

But not so the car maker. He knows what a fan belt is up against in that oil-drenched, water-soaked, sizzling hot furnace under the hood. He knows that ordinary belts go to pieces after a short term of service because they are incapable of resisting the continued onslaughts of heat, oil and moisture.

So he experiments before he buys—puts the competing belts through laboratory experiments and break-down, wear-out tests that reveal their stamina and worth. Do they wear quickly, get hard, rot, break, tear, stretch, shrink? *He soon finds out.*

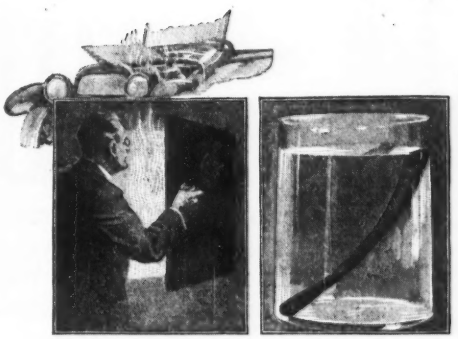
And so you find Gilmer Woven Endless Fan Belts on eight out of every ten cars—*standard equipment*—in spite of their higher cost to the car maker. For Gilmer Belts *hold up,* when others have faltered and collapsed under the relentless testing at the hands of the manufacturer. Gilmer Belts contain no rubber or other ingredients that can not resist heat, oil and moisture.

This is the fan belt dealers sell easiest and most often—the car maker's choice—the belt that stays sold longest—the belt car owners ask for a second time and a third, and *always.*

DEALERS

Ask your jobber about the "group-and-carton" method of selling Gilmer Belts: Where you pick the right sized belt at a glance. Write him today.

L. H. GILMER CO.
Philadelphia, Pa.



THE HEAT TEST

The heat test quickly robs ordinary belts of their flexibility and causes the surface to become hard and brittle, thus proving that they will slip and disintegrate rapidly when in actual service under the hood.

THE OIL AND WATER TEST

The oil test quickly detects the presence of rubber or any ingredients easily affected by oil. The water or moisture test causes many types of belts to shrink or stretch, thus proving that they will require constant adjustment when in use. Gilmer Belts are totally unaffected by oil or moisture.

Gilmer
WOVEN ENDLESS
FAN BELTS

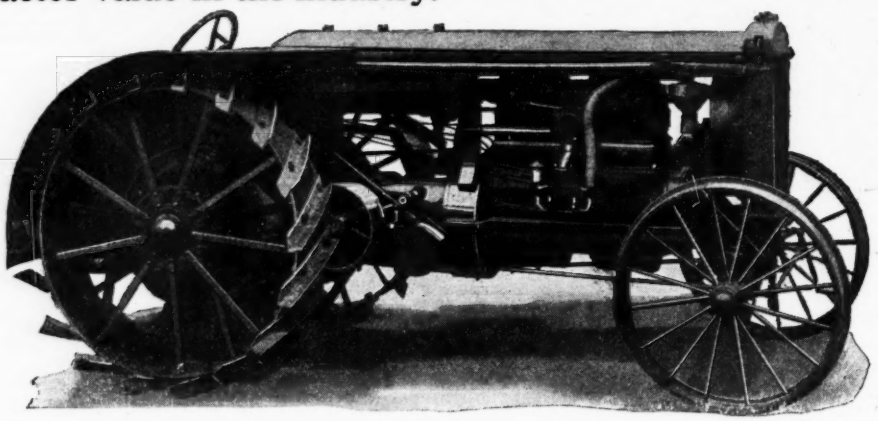
TRADE MARK
Gilmer
WOVEN PRODUCTS PHILADELPHIA

"A Spare Fan Belt is as important as a Spare Tire"

Prices Now 18-30 $1785 6-12 $795

A reduction of $200 on the big Allis-Chalmers Farm Tractor

made in the face of general advances by other big manufacturers and on the Allis-Chalmers 18-30, which even at the old price, was accepted as the biggest tractor value in the industry.



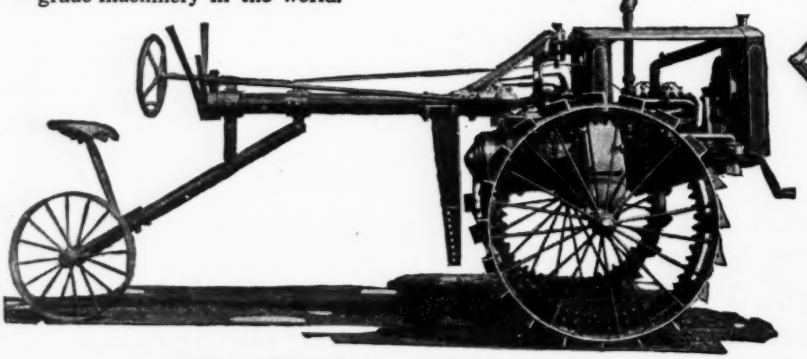
ALLIS-FARM CHALMERS-TRACTORS

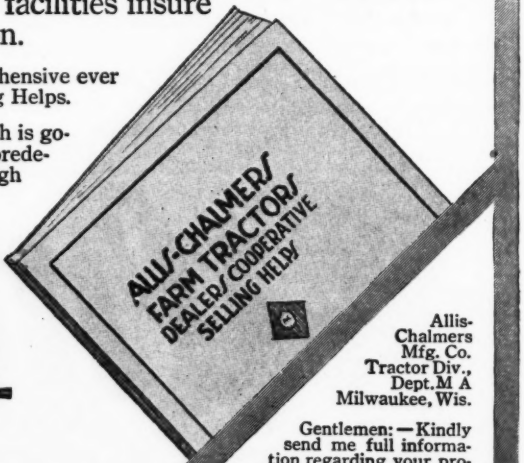
Huge production in one of the largest plants in the world devoted to the manufacture of high grade machinery makes our remarkable reduction in price possible. We build Allis-Chalmers Farm Tractors complete, except carburetor and magneto, from radiator to drive wheels in our own plants.

Insure yourself the dealer supremacy that will come to you if you represent the manufacturer whose product is the dominant one. $3,000,000 spent in the past four years on experimental and development work insure superior design. Financial and manufacturing facilities insure production.

For Dealers Who Qualify—Our sales cooperation is the most comprehensive ever put back of any tractor dealer. Ask to see our Dealer's Cooperative Selling Helps.

Distributors and Dealers—Be sure that the tractor line you tie up with is going to bring you a permanent business. Allis-Chalmers Mfg. Co. and its predecessors have been known for 65 years as one of the largest manufacturers of high grade machinery in the world.





Allis-Chalmers Mfg. Co.
Tractor Division
Milwaukee Wisconsin

Allis-Chalmers Mfg. Co.
Tractor Div.,
Dept. M A
Milwaukee, Wis.

Gentlemen:—Kindly send me full information regarding your proposition.

Name _____
Street _____
City _____
State _____

STARTING · LIGHTING





GRAY & DAVIS

Quality

GRAY & DAVIS Starting, Lighting, Ignition systems have been adopted by leading motor car builders, because of exceptional Quality, plus the knowledge that G & D equipment gives satisfactory service under all conditions. Gray & Davis systems are bought and used solely on the basis of reliable performance. Long experience in building electrical equipment; proven design and simplicity add essential factors which make for efficiency.

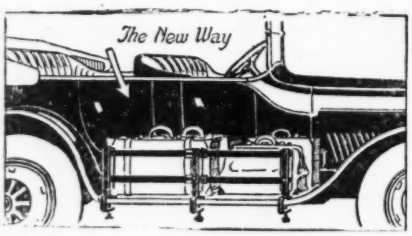
GRAY & DAVIS, INC.

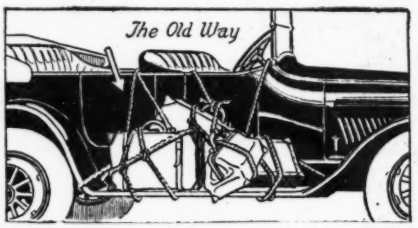
Boston Mass.

IGNITION

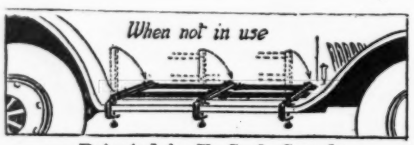
Be Sure to Get These
THREE BIG SELLERS

1





Marquette Luggage Carrier



Patented in U. S. & Canada

The All-Steel Carrier. Built for Service Made in two sizes—the smaller size for running boards up to four feet, and the large size to five feet. Folds down compactly when not in use Safely and quickly attached to any make car without tools. Saves room in the car. Does not detract from the appearance of the car. Does not interfere with the comfort of passengers. Carries Luggage Safely. No shifting about of bags or bundles. A popular big seller for all live dealers. Remember, it FITS ANY CAR.

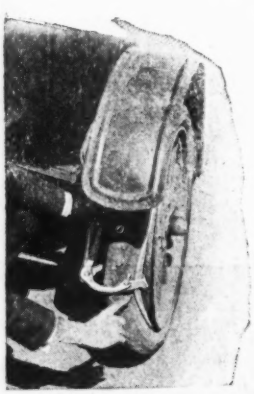
2



The Marquette Is King of All Tire Tools

MARQUETTE TIRE TOOL

A practical necessity for every driver. Saves all the hard dirty work of tire changing. The Marquette Tire Tool was designed for one purpose only—to take the exasperating drudgery out of tire changing. It is to a tire what a screw driver is to a screw. Grips and holds a tire without tearing. Tire's off in a minute, and on in another. Thousands of these Tire Tools in use. Every car owner wants one, needs one, and will buy one if you carry them in stock. Advertising matter and signs supplied all dealers FREE. If your jobber cannot make immediate delivery, shipment will be made from the factory.





Going **Reverse the operation for mounting tire** **Off**

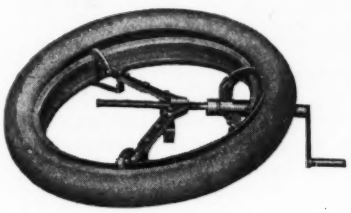
From Your Jobber

MARQUETTE LINE

3

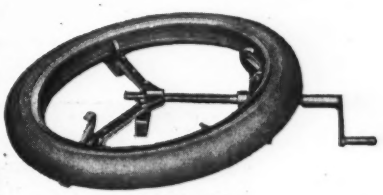
LITTLE GIANT

SPLIT RIM TOOL



Contracted

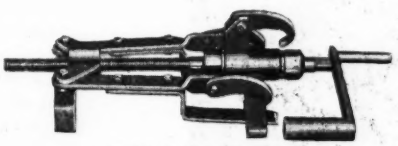
Is an absolute necessity in every tire repair shop and garage. It saves its cost in a few days in time-saving tire changes. Low enough in cost to put one in every service car. Can be used as stationary appliance by fastening to block or bench. Folds up compactly for storing out of the way or in tool box of service car. Perfect in operation for roadside changes.



Expanded

The high cost of Split Rim Tools heretofore have limited their use, and the Little Giant now offers every service of any similar tool, and at a BIG SAVING in first cost, as well as the advantages of its portability. Simple, strong, light, and absolutely dependable. It grips the rim tenaciously, contracts it quickly and expands it perfectly. Dealers having the Little Giant in stock ready for immediate delivery will reap the harvest of this NEW quick seller. Nationally advertised. It saves for the Repair Man—and it makes for YOU. No further need of a spring leaf and hard work—just a few minutes with the Little Giant and the Tire is changed without perspiration and dirt.

Absolutely efficient, light, strong and durable.



Folded for Carrying

No shop can afford to be without a Little Giant.

REASONS WHY

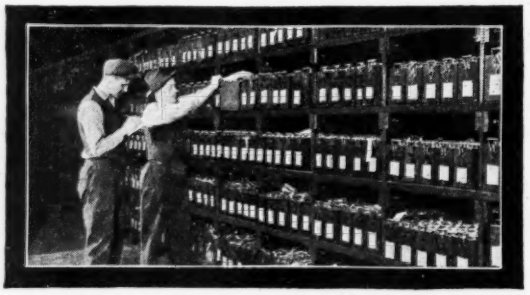
Marquette Specialties have a constant demand everywhere, because they are built for service. Quality of material and workmanship establish them as high grade tools and equipment, and the National Advertising we do builds a ready market for all dealers. Take advantage of this opportunity and stock these THREE SPECIALS at once. They are not ordinary lines. They are Feature lines that do not require big investments. Quick shipment of orders and prompt attention to correspondence gives you preferred service. Cuts supplied for your catalog and newspaper advertising. Descriptive circulars and window cards to every dealer. Send trial order today. If your jobber cannot make prompt shipment orders will be filled from the factory either through your jobber or direct.

MARQUETTE MANUFACTURING CO., INC.

Saint Paul, Minnesota

Battery Life Depends upon INSULATION

1



There's only one sure-fire preventive against aging on the shelf—that is to store the batteries in true bone-dry condition, which is possible only with the Willard Battery containing Threaded Rubber Insulation.

2



The life of the battery is largely up to the man in the car, but Threaded Rubber Insulation adds greatly to its chance of long service, because it removes one of the commonest causes of battery trouble—breaking down of the insulation.

3



Nearly every battery with *ordinary* insulation has to be re-insulated at least once during its lifetime. Willard Threaded Rubber Insulation never has to be replaced.

Threaded Rubber Insulation has these three distinct advantages over any other:

1. Threaded Rubber Insulation eliminates depreciation in the dealer's stock.

Willard Batteries with Threaded Rubber Insulation, since they have no wood insulation in any form, can be shipped and stored bone dry—since neither plates nor insulation in the battery have ever been wet.

The storage battery with wood insulation in any form can not be kept in a dealer's stock without depreciation, because wood insulation must be put into the battery wet at the factory, and, once the insulation is wet, a continuous chemical action begins; and furthermore, the insulation can not be allowed to be dried out, as it would become damaged. Hence the battery must soon be filled.

2. Threaded Rubber Insulation returns bigger dividends to the user.

Threaded Rubber Insulation is a manufactured product held to rigid uniformity, more durable and long-lived than any wood can be. The car owner is not wholly relieved of caring for his battery, but the battery will stand more abuse, and function at high efficiency for a much longer time.

3. Threaded Rubber Insulation makes reinsulation unnecessary.

When installed in the car no one can say just how soon wood insulation will begin to break down, on account of the impossibility of securing absolute uniformity in wood, since it is the product of nature, not of scientific manufacture. During this period even careful driving and faithful attention to battery care will not absolutely insure long life.

Re-insulation—at considerable expense—is almost certain to come before the ordinary battery is worn out, and the life of any battery after re-insulation is uncertain.

Threaded Rubber Insulation outlasts the plates and re-insulation is, therefore, unnecessary.

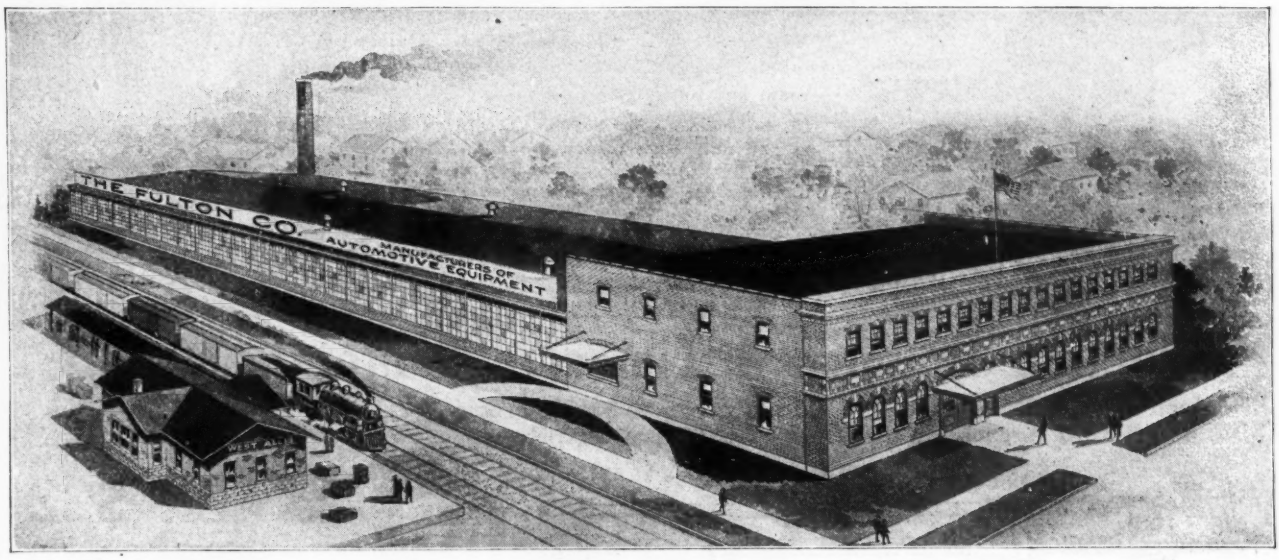
Willard STORAGE BATTERY

Willard Threaded Rubber Insulation

THE NEW HOME
of
THE FULTON COMPANY

Milwaukee, Wis. **West Allis Plant**

Manufacturers of Automotive Equipment



(Birdseye of New Building)

THE name "FULTON" is a big word in the Automobile Accessory business today. It used to mean a small shop and one man, to whom dollar-for-dollar value was an ideal, a watchword. Today, after years of patient endeavor, it means a vast Organization, a combination of Brains, Money and Skilled Workmen, a Great Enterprise—but the man and his ideal remain unchanged. Users of Fulton Accessories agree that their maker has completely made good his determination, expressed years ago.

Two Fulton Made Favorites

"Eklips"



"Eklips" Spark Plugs—two types, Eklips Giant and Eklips "C"—are made of highest quality imported, hand-turned porcelains. Mechanically it is impossible to produce a better Spark Plug at any price. They have earned the splendid reputation they enjoy, because of an in-built strength that means real service, and they will continue to remain worthy of it.

Some outstanding "Eklips" features are: Leak-proof, Soot-proof, and efficiency increased three-fold by *three* positive sparking points.

The Eklips Giant type is made extra heavy for strenuous duty, especially adapted for high power motor use.

The Eklips "C" is designed to meet the demand for a lighter plug where quality and price are carefully considered.

Retail Prices

Eklips "Giant" $1.00
Eklips "C" ..... .75



The Aermore Horn is constructed of four brass tubes, heavily nickled, and produces a slow, low, harmonious chord, that may be heard a mile or a block away. Audible above the din of conjested traffic, it warns but does not frighten. Its unusual tone qualities seem to ask the right of way with a smile rather than an offensive growl. The Aermore is truly the aristocrat of motor signals.

The AERMORE Exhaust Horn

Manufacturers of Fulton Mud Hooks, The Aermore Exhaust Horn, Eklips Spark Plugs, the Handy Valve Lifter. Sales Managers for American Bumpers, The Cooper "Special" Cutout Valves and Outfits; Bull Dog Foot Accelerator for FORD cars, American Ford Tire Carriers, American Ford Steering Wheels and Monroe Self-Oiling Tire Pumps.

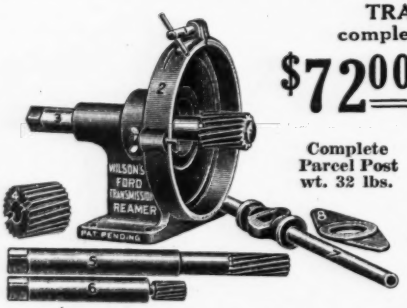
THE FULTON COMPANY

Milwaukee **Wisconsin**

WILSON'S SPECIAL TOOLS for FORD REPAIR SHOPS

"Save 75% of Your Labor Costs—Do Better Work"

TRANSMISSION BUSHING REAMING MACHINE
completely remanufactures a transmission in 30 minutes

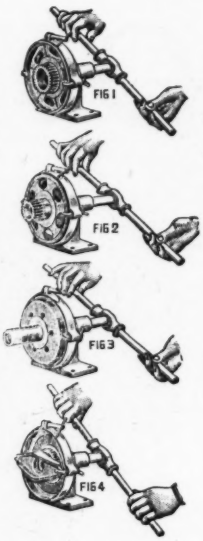


$72.00

Complete Parcel Post wt. 32 lbs.

Transmission gear bushings reamed with this machine will run absolutely noiseless, without wobble or excessive wear. It is impossible to do a perfect job by any other method. Average time required to set up and ream any bushing, 2 minutes.

Recommended by Service Dept. of Ford Motor Co. is the only satisfactory means of B manufacturing of Ford Transmission. Pays for itself in actual saving of time. **Satisfied customers every time.**

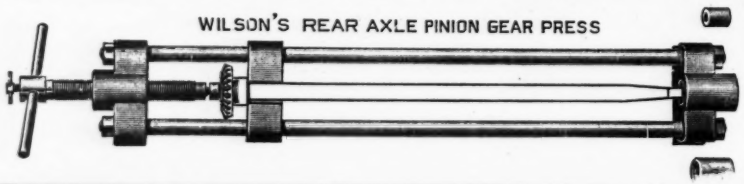


PLACE YOUR ORDER NOW—Direct with factory or through any branch of Ford Motor Co. or Fairbanks Company, or other reliable jobbers.

The FAIRBANKS Company O.K.

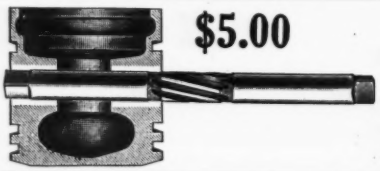
Production Doubled 4 Times in 9 Months

To Keep Up With Demand for Wilson's Labor Saving Tools
39% of All Ford Agencies in the World Use Transmission Reamer



WILSON'S REAR AXLE PINION GEAR PRESS $22

Takes off and puts on the tightest gears with ease. Leverage 168 to 1 no matter how tight. It makes 'em off this press is a necessity in every well equipped shop. Always ready. A workmanlike job every time. **Shipping weight 60 lbs. crated.**



$5.00

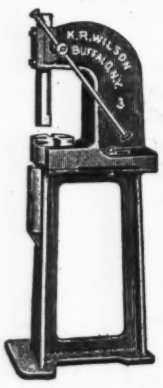
WILSON'S SELF-ALIGNING PISTON BUSHING REAMER

Absolutely unequalled by any other. Only method of getting a perfect fit.

Cam Shaft Aligning Reamer $12.00



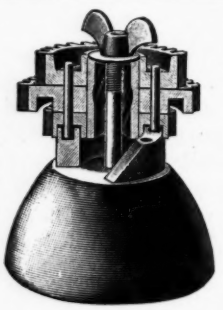
Only means of getting rear bearings in perfect alignment with front and center bearings. Takes out that disagreeable cam shaft knock.



WILSON'S ARBOR PRESS

Especially adapted for all Ford work except axle shafts leverage 46 to 1. This is a sensitive press, enabling operator to "feel" exact amount of pressure being applied. A sensitive press is necessary even though you may have a large compound press.

Price complete, as shown..... $45
Price without Stand..... $25



WILSON'S TRIPLE GEAR RIVETING JIG $4.00.
Makes Old Gears Good As New.

Don't throw away perfectly good gears. Pins get loose allowing gears to shift and bushings become loose. This jig and 5 minutes' time makes it good as new.

Re-Facing Tools for Spindle Body Bushings and Axle Forgings.
Also Propeller Shaft Bearings.



Price $5 Spindle Facer

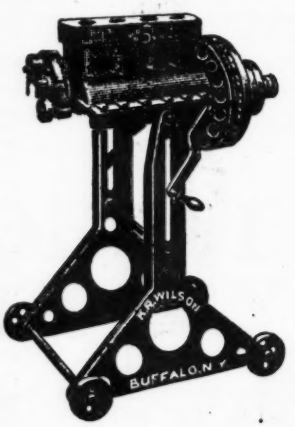


Price $6 Propeller Shaft Bearing Facer

MOTOR STAND
$20.00

Does the Work of One Man

Motor can be turned any position, saving time on every operation, being portable. Load motor on at the car and roll away to your shop.





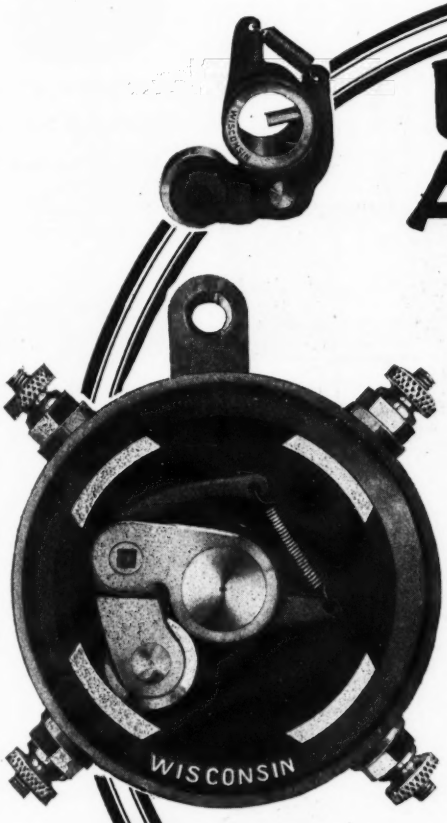
28.00

Recently perfected—a new steel and tempering process enables us to claim the only perfect main bearing and connecting rod aligning reamer on the market at any price. Few mechanics realize how much more difficult it is to build a reamer for babbitt, than for any other material. It has cost us two years' experimenting and several thousand dollars to make a satisfactory reamer. Spiral fluted cutters cut freely without jumping at bearing clearances and oil grooves, leaving perfectly smooth, highly polished finish. This reamer fully guaranteed, will be repaired or replaced without charge if it fails to satisfy.
Full set Fordson equipment being perfected.

Manufactured by K. W. WILSON, 10-16 Lock St., Buffalo, N. Y.

Wisconsin TIMER

for Ford Cars Trucks and Tractors



Unusually Accurate

The WISCONSIN Timer is as nearly correct as it is humanly possible to make it. This timer is a product of unusual workmanship in every detail. The materials are the best that can be obtained, including steel, brass and bronze. All working parts are polished and ground.

Throughout the WISCONSIN is an unusually well built Timer—the leader in its field. It is a **success**—a money-maker for dealers.

The Shell—Stamped from high grade nickel finished steel.

The Fibre—Made of bone dry grey fibre that positively will not absorb oil. Pressed in the shell under hydraulic pressure; fits tight so no oil can get behind ring to "short" the timer. Wears even, and smooth-roller will never jump the contact points.

Contacts—Made of high grade steel, case hardened and ground.

Roller Assembly—Made of bronze castings—roller of high grade tool steel, ground and polished to finish.

Dealers:—You are taking no chances with the WISCONSIN. It has made good. **It's a success.** For the sake of bigger winter business get our dealer proposition. Write for details.

WISCONSIN TIMER MFG. CORP.
Menomonee Falls, Wisconsin
Sales Department—J. Wadsworth Staff
122 S. Michigan Blvd.,
Chicago

PRICE
$2.00

In Canada $3.00

IBSCO

Automatic Battery Steamer and Still

A Necessity in Every Battery Station

ARE you still using a putty knife, the old fashioned hot water tank and other long discarded methods to open batteries?

Why continue to waste your own and customers' time when an IBSCO Automatic Battery Steamer can open a battery in less time than it takes to tell about it—one cell at a time if need be—no waiting—no wasting of the good cells in a battery and at less actual operating cost.

In smaller shops it would be a waste in fuel to keep the steamer hot all day. With the Automatic Combination Battery Steamer and Still there is no waste of fuel, while batteries are not being steamed, water is being distilled at the rate of one gallon per hour. This catches the customers that are in a big hurry.

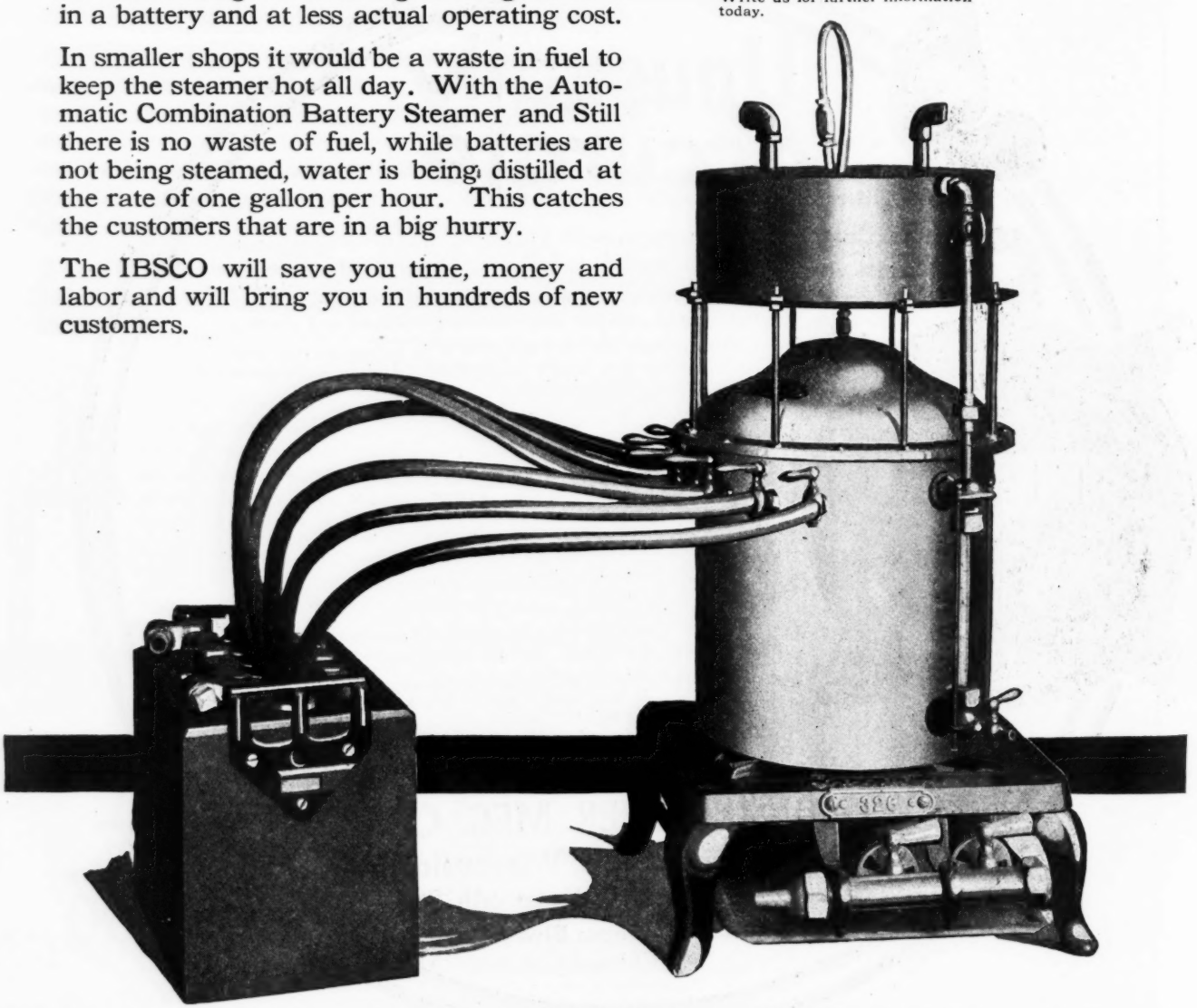
The IBSCO will save you time, money and labor and will bring you in hundreds of new customers.

IBSCO Steamers are made of aluminum and brass alone—materials which are not affected by the acid and acid fumes. They will not rust or corrode.

This combination steamer and still comes all complete, with all necessary valves, steaming hose, etc. Can be supplied with automatic attachment for connection with city water supply.

Steamer may be had without still attachment if desired.

Write us for further information today.



Manufactured by the ILLINOIS BATTERY STEAMER COMPANY, Peoria, Illinois

Sales Department:

THE BAILEY-DRAKE COMPANY, *Inc.*, 1120 S. Michigan Ave., Chicago, Illinois

DEALERS—It's Easy to Sell

BOKO COLLAPSIBLE PRODUCTS

Manufactured by
Defiance Welding Co. — Defiance, Ohio



The Boko Bucket

For Gasoline or Water

With Self-Contained Funnel

Cat. No. 1500
Each $1.75



Folded



The Boko Bucket

For Gasoline or Water

Without Funnel

Cat. No. 1507
Each $1.00

Money Making Equipment

JOBBERS—Right now is the time to list these fast selling BOKO Products in your new catalog or bulletins. Any or all cuts appearing on this page, or listed in our regular catalog will be supplied immediately.

DEALERS—Keep a good stock of BOKO Products on hand. These handy devices sell all year 'round. Dealer discounts on BOKO Products are unusually interesting. Order from your jobber or write us direct.

Sales Department

The BAILEY-DRAKE COMPANY, Inc.

1120 Michigan Ave. **CHICAGO**



The Boko Folding Steel Stool

Cat. No. 1100
Each $1.25

DEALERS

Discounts on Boko Products Are Exceptionally Liberal. Order from Your Jobber TODAY.



Boko Wash Aprons

Cat. No. 1545
Each $2.00

WORKRITE HYDROMETERS



WORKRITE HYDROMETER

For General Use in Garages or By Car Owners

The rubber collars at each end of hydrometer protect it from breakage if dropped. The square collar prevents rolling. Slotted washer inside acts as a cushion for float, and prevents it from shutting off the outlet.

The *FLOAT IS ALWAYS IN PLAIN VIEW,* and there is no plug in bottom to drop out, spilling the acid and breaking the float. Rubber fittings are made of unusually high-grade stock, insuring strong suction and long life. Graduations on float guaranteed accurate. Securely packed in mailing tubes. Used by leading battery manufacturers, car manufacturers and the U. S. Government. The hydrometer to use and to sell. TRY IT!

Shipping weight ½ lb.

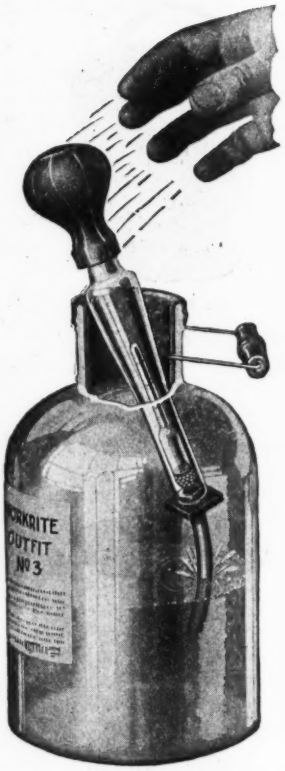
List price $1.00

NO. 3 WORKRITE HYDROMETER OUTFIT

For Fast Work in Garages and Service Stations

"Grab It Out and Drop It In"

The soft rubber-lined mouth of the gallon water jar prevents breakage when grabbed out or dropped in a hurry. Easy to carry to the car. Large pear-shaped bulb is made from almost pure gum—it will last. The carrot-shaped glass barrel insures free floating of the hydrometer. This barrel is molded from thick, tough glass and will stand a lot of bumps without breaking. Float guaranteed accurate. Our No. 3 Outfit is designed throughout for fast and rough use in battery service stations and garages. Just what you need. Packed in corrugated boxes.



Shipping weight, 5 lbs. List price.....$2.50

NO. 1 WORKRITE HYDROMETER OUTFITS



For Car Owners and Small Garages

Consists of standard WorkRite Hydrometer described above, fitted in quart jar, for keeping distilled water. Both hydrometer and water are clean and ready for instant use. Blank spaces on label for recording last time filled and tested. Three years of successful sales have made this a standard article in automotive supplies. Packed in individual corrugated cartons.

Shipping weight, 2 lbs.

List price $1.50

NO. 2 WORKRITE HYDROMETER OUTFITS

For Use with House Lighting Plants

A standard WorkRite Hydrometer is fitted tightly in the cap of a gallon jar. Easy to take to town for distilled water. Hydrometer and water are safe and clean—always ready for use. With this No. 2 Outfit, we furnish a special float for testing lighting plant batteries. Full instructions, of course. Packed in corrugated boxes.



Shipping weight, 5 lbs. List price.....$2.50

Accept no substitute. Write us for name of nearest Jobber carrying a stock.

THE WORKRITE MFG. CO.

5604 Euclid Avenue CLEVELAND, OHIO, U. S. A.

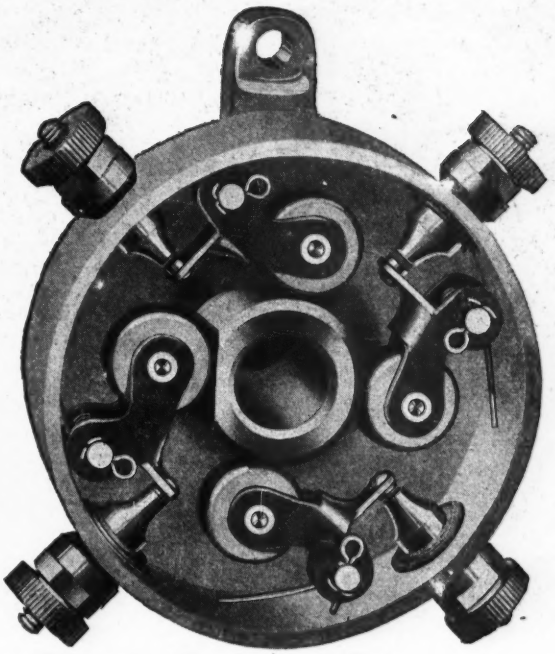
DUNTLEY
MAGNETO BREAK
TIMER

Sturdy, unbreakable Terminals Individual magneto break for each cylinder.

Heavy genuine Tungsten contact points that will not corrode, pit or burn out.

Hardened Steel Cam. Will not wear.

Extra hard and tough Fibre rollers in drawn steel rockers.



Absolutely Guaranteed for 50,000 Miles

A Strong, Hot Spark That Starts the Motor with One Turn

Cold weather starting has no terrors for the Duntley equipped Ford Car. The Duntley delivers a big, fat spark every time to each cylinder. The Tungsten points give a positive make and break contact. There are no sliding contacts to jump and skip over metal segments.

You do not have to lubricate the Duntley Magneto Break Timer. Just put it in and forget your worries. Therefore there is no insulation from oil.

It is interchangeable on regular Ford fittings.

The tremendous guaranteed mileage, the increased motor efficiency, the saving in fuel that the Ford owner gets from the Duntley makes it the most economical timer on the market.

Sold on an Absolute Money Back Guarantee

Car Owners: Learn more of the many advantages you can derive from the Duntley. Write us today.

Dealers and Jobbers: We have a mighty interesting proposition for you—write for it.

J. W. DUNTLEY

1004 Michigan Ave. Chicago, U. S. A.



Giant Grip Gave Full Traction and This Truck Pulled Out in Two Minutes

SUCH accidents as this are frequent occurrences. Usually they mean a loss of time, interrupted haulage schedules and unsatisfactory service to customers.

Giant Grip Traction Equipment is being brought to the attention of truck owners and operators the country over. A series of compelling advertisements in great national publications will show clearly the economy and efficiency of fitting every truck with this superior traction equipment.

This campaign is unusually timely because of the nation-wide movement for truck transportation. Dealers who handle Giant Grip Traction Equipment will reap the benefits in a large and profitable business.

Giant Grip Traction Equipment consists of clamps which are left on the wheels permanently, and of cross chains which can be hooked on in two minutes' time. No jacking up the wheels or moving the truck around—no tools to apply the chains.

There is a size to fit every type and make of wheel. Yet the dealer has fewer models to handle than in any other line. All parts are heat-treated and rust-proofed. No more efficient or durable equipment is to be had.

Write without delay for our dealer proposition and full particulars of the Giant Grip line. Let the selling power of our national advertising bring the trade to you. Dept. 14.

Challoner Company *Established 1863* **Oshkosh, Wisconsin**

Giant Grip

Traction Equipment for Motor Trucks

Victor Gaskets Dominate

OUR recognized leadership in the automotive industry to-day is due to our policy of holding steadfastly to the original ideals of specializing entirely upon copper and asbestos gaskets for internal combustion engines.

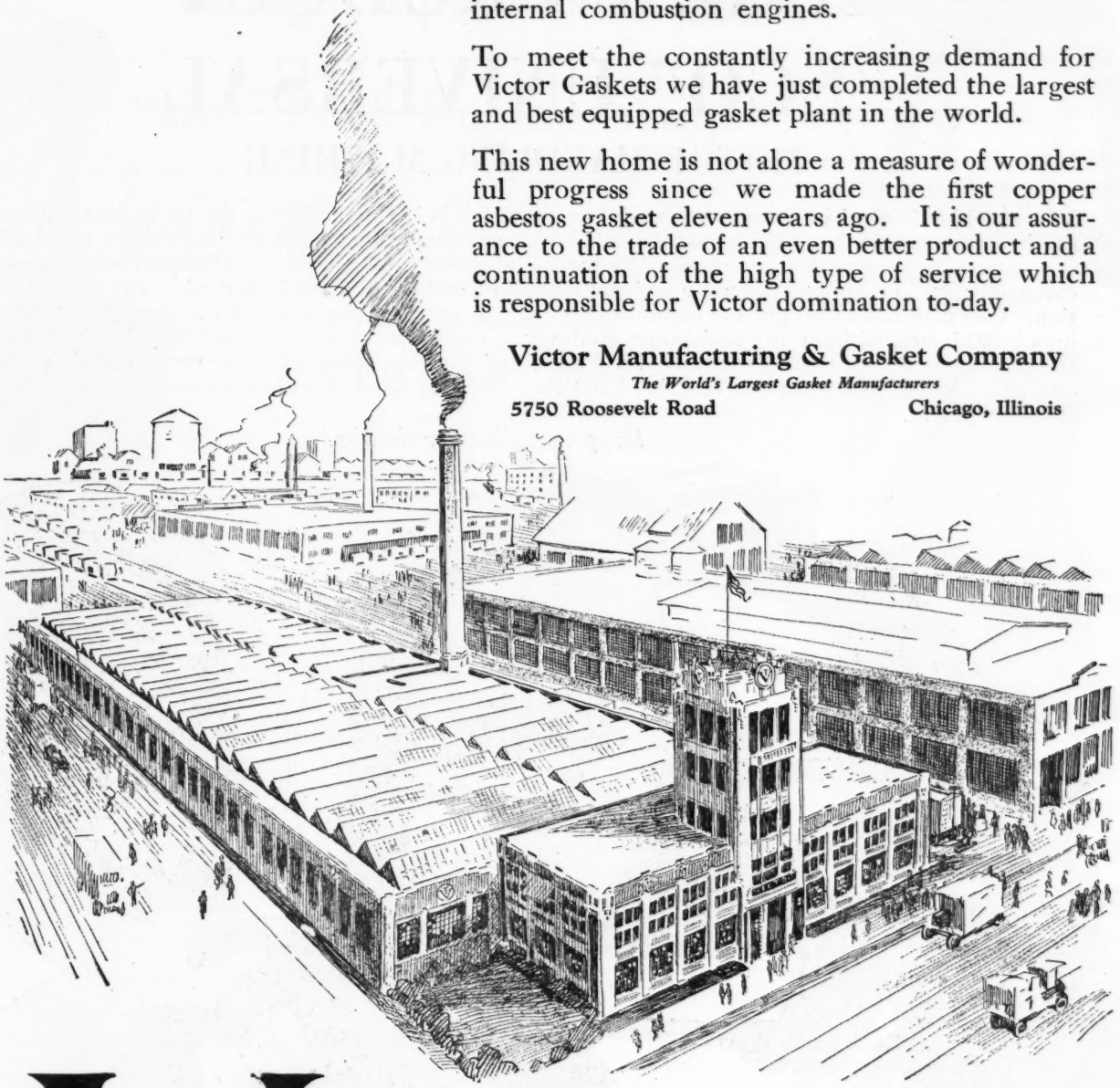
To meet the constantly increasing demand for Victor Gaskets we have just completed the largest and best equipped gasket plant in the world.

This new home is not alone a measure of wonderful progress since we made the first copper asbestos gasket eleven years ago. It is our assurance to the trade of an even better product and a continuation of the high type of service which is responsible for Victor domination to-day.

Victor Manufacturing & Gasket Company

The World's Largest Gasket Manufacturers

5750 Roosevelt Road **Chicago, Illinois**



VICTOR GASKETS

The World's Standard Gaskets

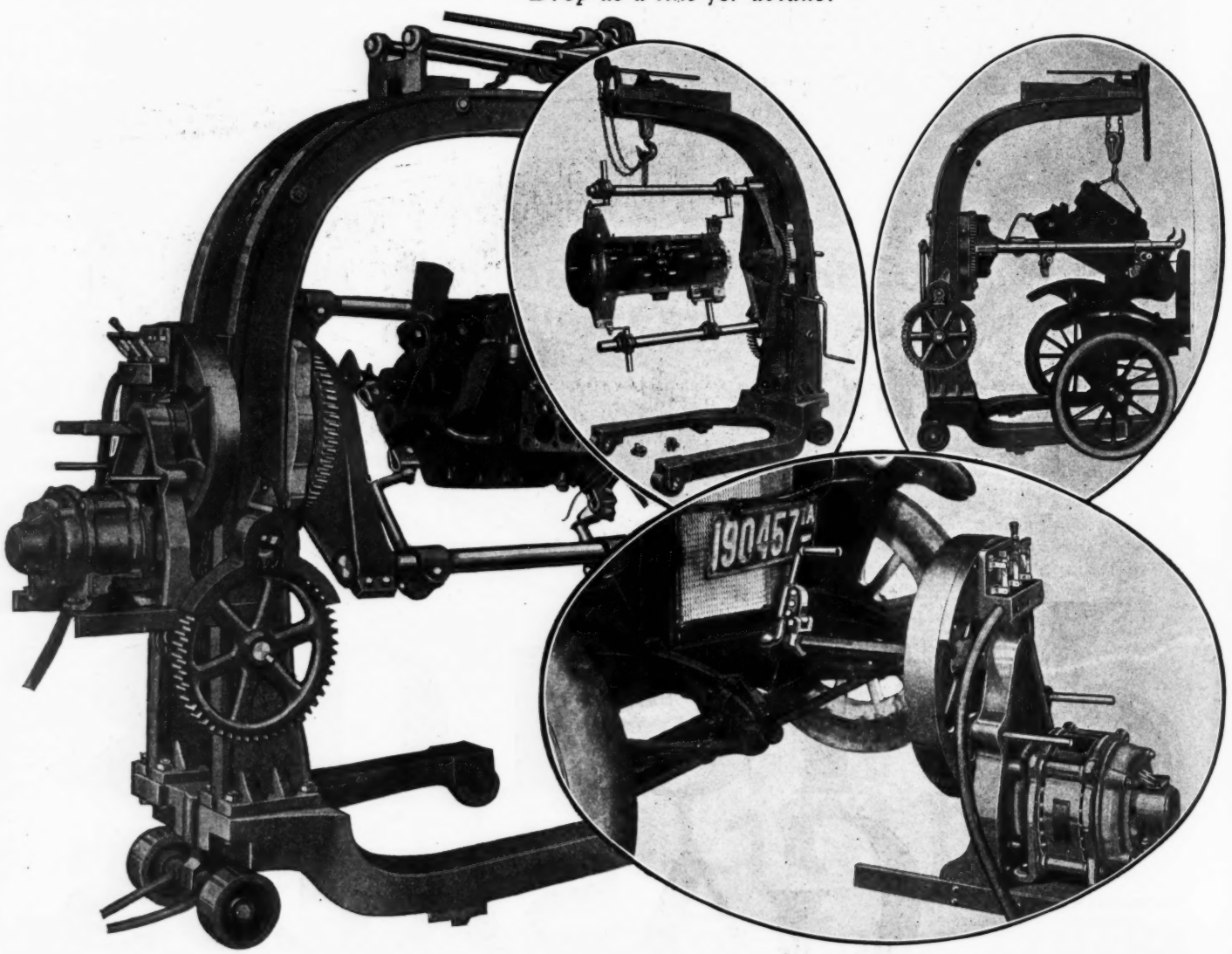
(1)

ANNOUNCING A NEW PRODUCT "ECO" UNIVERSAL

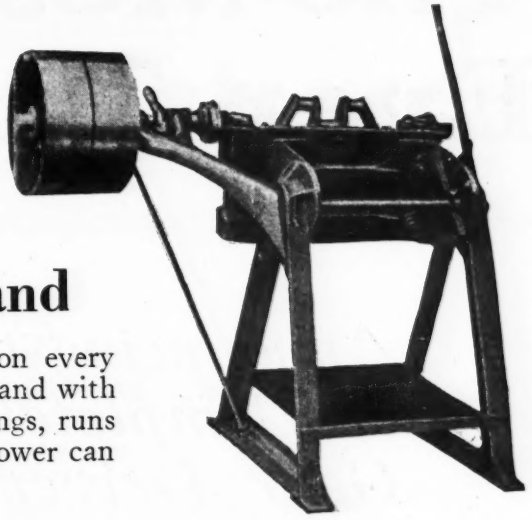
MOTOR HANDLING MACHINE

This machine is used in three ways, each one of which is indispensable to the up-to-date garage or service station. The "ECO" Universal is a hoist, every-way engine stand and burning-in stand all in one. It can be used with every make of motor. The motor can be lifted out of the car with magneto, carburetor, etc., or can be started up and run while in the stand and can be turned in any desired position. One man has taken out the big Buick "6" motor, put in a new crankshaft, burned in the bearings in 20 hours, without any assistance whatever. The crane or hoist is made of steel, the engine stand is made of steel castings with cold roll bars, and the every-way attachments are made of steel castings. Weight of complete machine 2500 lbs. In your shop it will be among your most valuable equipment.

Drop us a line for details.



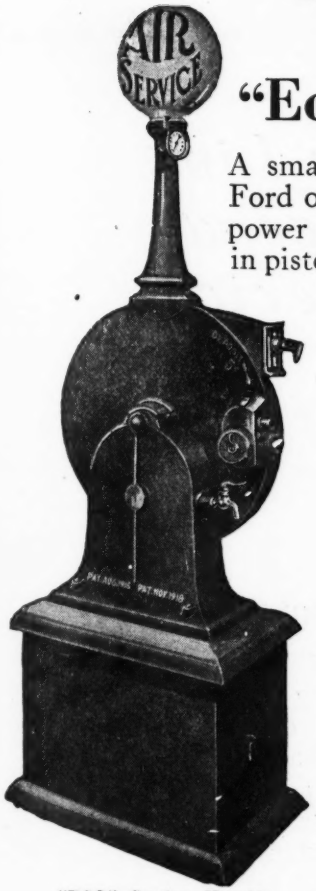
Profit Making and Time Saving Garage Equipment



"Eco" Ford Engine Stand

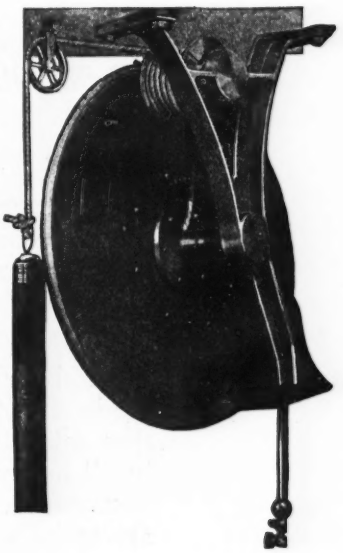
A small initial investment will save time on every Ford overhauling job in your shop. This stand with power attachment burns in crankshaft bearings, runs in pistons and does any other work where power can be used in place of hand labor.

Drop us a line for complete details.



"ECO" Station No. 21
Has its own compressor. Dropping a coin releases hose reel and starts the pump.

"Eco" Air Stations



Dead losses caused by free air service are a thing of the past with ECO equipped garages. Car owners are glad to pay for the air they get—it doesn't obligate them. "ECO" Air Stations are operated with coins. Equip your garage with one of these modern systems and convert into a profit that which has always been a loss.

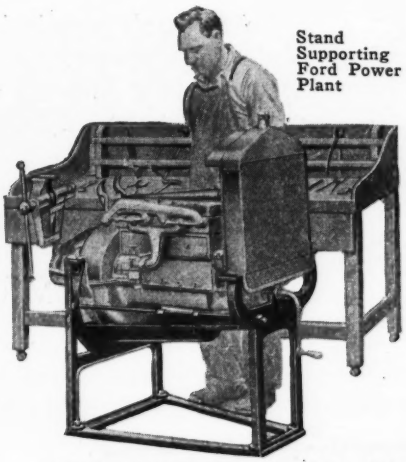
"Eco" Two-in-One Service Stand for Fords

Holds either the Ford power plant or rear axle. Supports the power plant at the same three points at which the plant is attached to the chassis. Every part can thus be easily reached. Power plant can be tried out under its own power on the stand. Saves time, labor and adds to the efficiency of your shop.

Drop us a line for complete details



"ECO" Station No. 10
Operates from your own compressor. A coin operates it—shuts off automatically when hose is released.



Stand Supporting Ford Power Plant



Stand Supporting Ford Rear Axle Unit

WESTERN MFG. COMPANY

OSKALOOSA, IOWA

The Most Progressive Ever Taken By Any

Announcing the First Complete Line of Completely Equipped Internal Gear Driven Trucks in America

In both design and equipment the new Jumbo line is at least two years in advance of competition.

There are many exclusive and original features of the new Jumbo complete line and yet there is not a single radical or freakish departure from sound practical design.

Jumbo Engineers have merely made inevitable improvements that must be eventually adopted in all heavy duty truck design if tomorrow's transportation needs are to be successfully met.

Jumbo trucks are the first to adopt construction changes that have been acknowledged, as the result of war tests, to be the ultimate accepted truck design.

Jumbo trucks are the first to include every equipment feature that the user needs for the most efficient operation of his truck. There are no extras to buy except body.

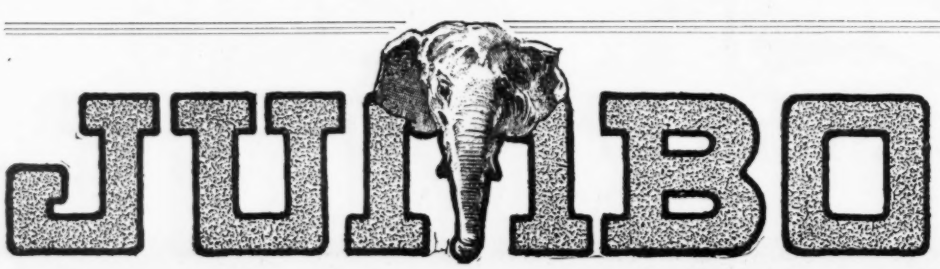
Standard Jumbo Equipment

Includes steel cab with fore doors, windshield, sliding sash curtains opening with doors, electric lights, storage battery, generator, ammeter, radiator shutters, moto-meter, fan shroud, radiator guard, extended frame forming bumper, hub-ometer, pig-tail tow hooks, spring draw bar, and 14 other big features.

Space won't permit description of design features that positively assure longer life and lower upkeep cost than any other truck built today.

NELSON MOTOR TRUCK COMPANY

SAGINAW MICHIGAN



MOTOR TRUCKS

and Far-Visioned Step Truck Manufacturer

Dealers—

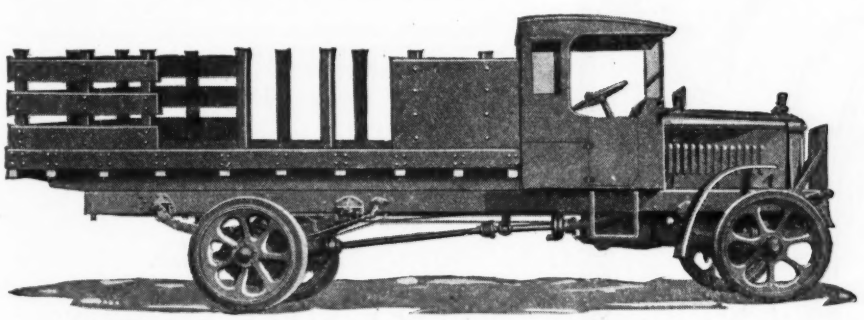
Sales resistance has been reduced to an absolute minimum in the new Jumbo line.

And bear in mind that in three years not a single Jumbo dealer has dropped the line, and that so far as we know there isn't a dissatisfied Jumbo owner in all the world.

Our new sales plan is, we believe, a most attractive truck proposition for the progressive and far-visioned dealer.

Write for literature and full information

NELSON MOTOR TRUCK CO.
Saginaw, Michigan



Model No. 35—7000 pounds capacity—solid tires.

Model No. 40—8000 pounds capacity—pneumatic tires.

This is the most completely equipped heavy duty truck in America.

Similar equipment is found on the 1½-ton and 2½-ton Jumbo Trucks.

BRIEF SPECIFICATIONS OF JUMBO TRUCKS

Buda Heavy Duty Engine.
Zenith Carburetor.
Clark Internal Gear Drive Axle.
Springs, highest grade chrome vanadium steel—cup design over axles eliminates spring slippage. Jumbo springs are from 6 to 10 inches longer than those of other trucks.
Brown-Lipe Transmission provides for mounting power winch, driving hoist, pneumatic tire pump, etc.
Brake equalizers insure even braking on each rear wheel.
Electric lights, electric horn, generator and storage battery.

Full specifications of each Jumbo model supplied to all inquirers.



Simplex Rim Remover

NISWANDER PATENTS

$3.50



The Rim is Drawn away and the Tire Falls off---when you Use a Simplex

This sounds pretty simple, doesn't it? Well, it is just that easy. And it is even easier to sell a SIMPLEX to any car owner who has ever changed a rim out in a sweltering summer heat, or a bleak February wind.

The SIMPLEX is so simple in construction and design that there isn't much to say about it, except that it does the work in a jiffy with remarkable ease.

Thousands of letters from dealers and users all over the country state that they wouldn't sell their SIMPLEX at any price if they couldn't get another SIMPLEX.

Use a SIMPLEX in your own shop. Every time you get a chance show your car-owner customers how easy the SIMPLEX operates, and you won't have any trouble making big sales and big profit.

Full details on request.

SIMPLEX STEEL STAMPING & MFG. CO.

1900-1928 Gravois Ave.,

ST. LOUIS, MO.

AUTOMOTIVE DEALERS—

THE SALE OF

WARNERLITE

PRODUCTS

Will insure your business against slow car deliveries and slack seasons, besides giving you the key to better invested efforts.

The WARNERLITE Power and Electric Lighting plant takes the drudgery out of farm life. It has been weighed in the scales of the purchaser's approval. It is a proven plant, up to the minute, standard in every particular.

High wages and shortage of help are compelling the farmer to adopt motors and modern methods to meet the situation.

The WARNERLITE storage battery lighting system, and self starters for Ford cars, are making money for scores of dealers, and are giving Ford owners a much needed and highly appreciated service.

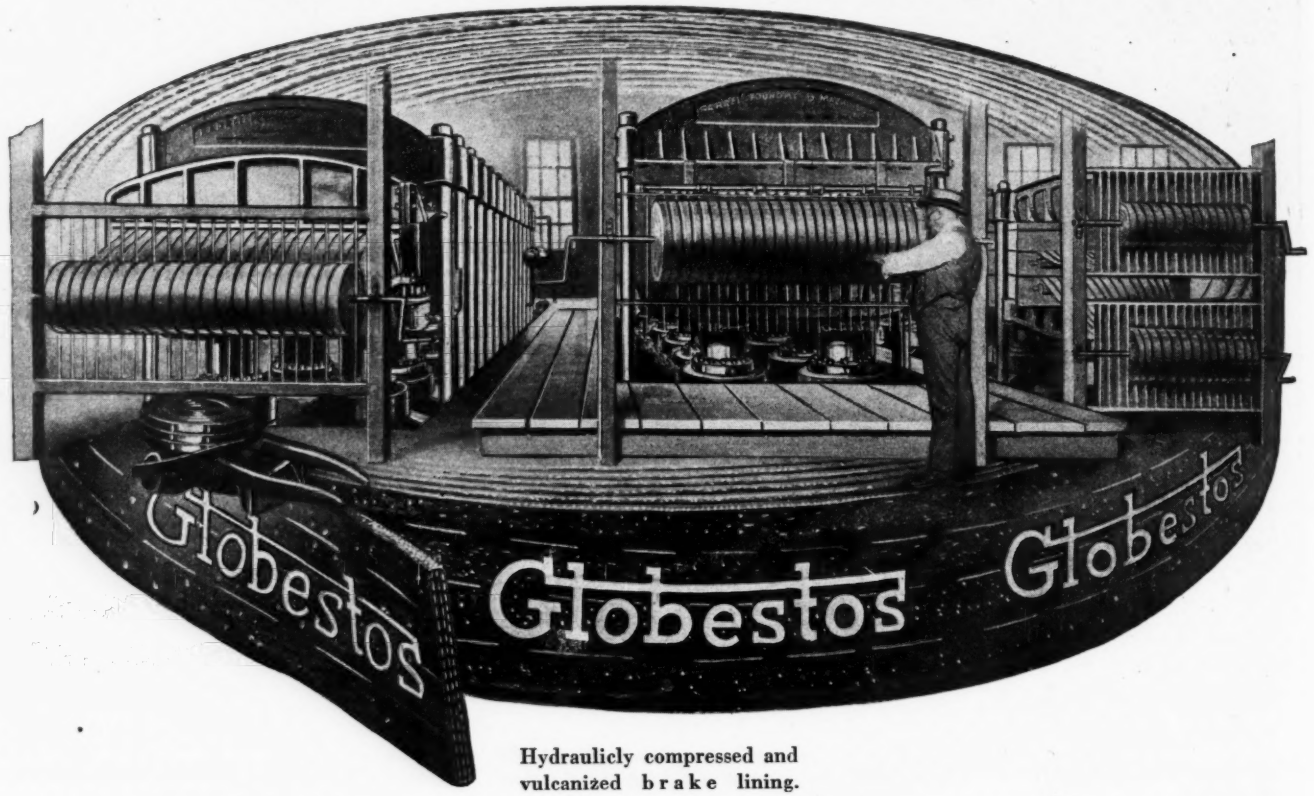
Write us for proof of these statements.

WARNERLITE COMPANY

Pasadena, California **Davenport, Iowa**

Our Daily Production

45,000 Feet Brake Lining



Hydraulicly compressed and vulcanized brake lining.

For upwards of twelve years we have been manufacturing large quantities of **"GLOBESTOS" BRAKE LINING.** The Hydraulically Vulcanized and Compressed, Folded and Stitched type, for the largest Automobile, Axle and Industrial plants in this country.

The above is a true photographic reproduction of THREE OF OUR GIANT HYDRAULIC PRESSES, with a daily capacity of FORTY-FIVE THOUSAND (45,000) FEET OF "GLOBESTOS" BRAKE LINING. This vast amount of Brake Lining is turned out every twenty-four hours.

Made only from the best materials obtainable (genuine long staple Canadian asbestos), under the supervision of expert engineers, by skilled and experienced workmen, and under daily laboratory inspection.

The original patentee of the first piece of Folded and Stitched Brake Lining recently spent several months in our factory improving our methods of manufacturing, adding many little advantages to the finished product found in no other Brake Lining today.

Correctness in width and thickness.
Pliability and Density.
PERFECT co-efficient of Friction.

These we offer with many other improvements found in no other Brake Lining today.

THE PRICE IS NO HIGHER THAN ORDINARY BRAKE LINING.

Every inch covered by a definite service guarantee.

Returnable in ten days at OUR expense if not entirely satisfactory.

Write for samples and trade discounts.

Globestos
HYDRAULIC COMPRESSED
FOLDED AND STITCHED BRAKE LINING
GUARANTEED

Factory and Main Offices

UNITED & GLOBE RUBBER CO., Trenton, N. J.

Branch Offices:

BOSTON
NEW ORLEANS
ST. LOUIS

NEW YORK

DULUTH
DENVER

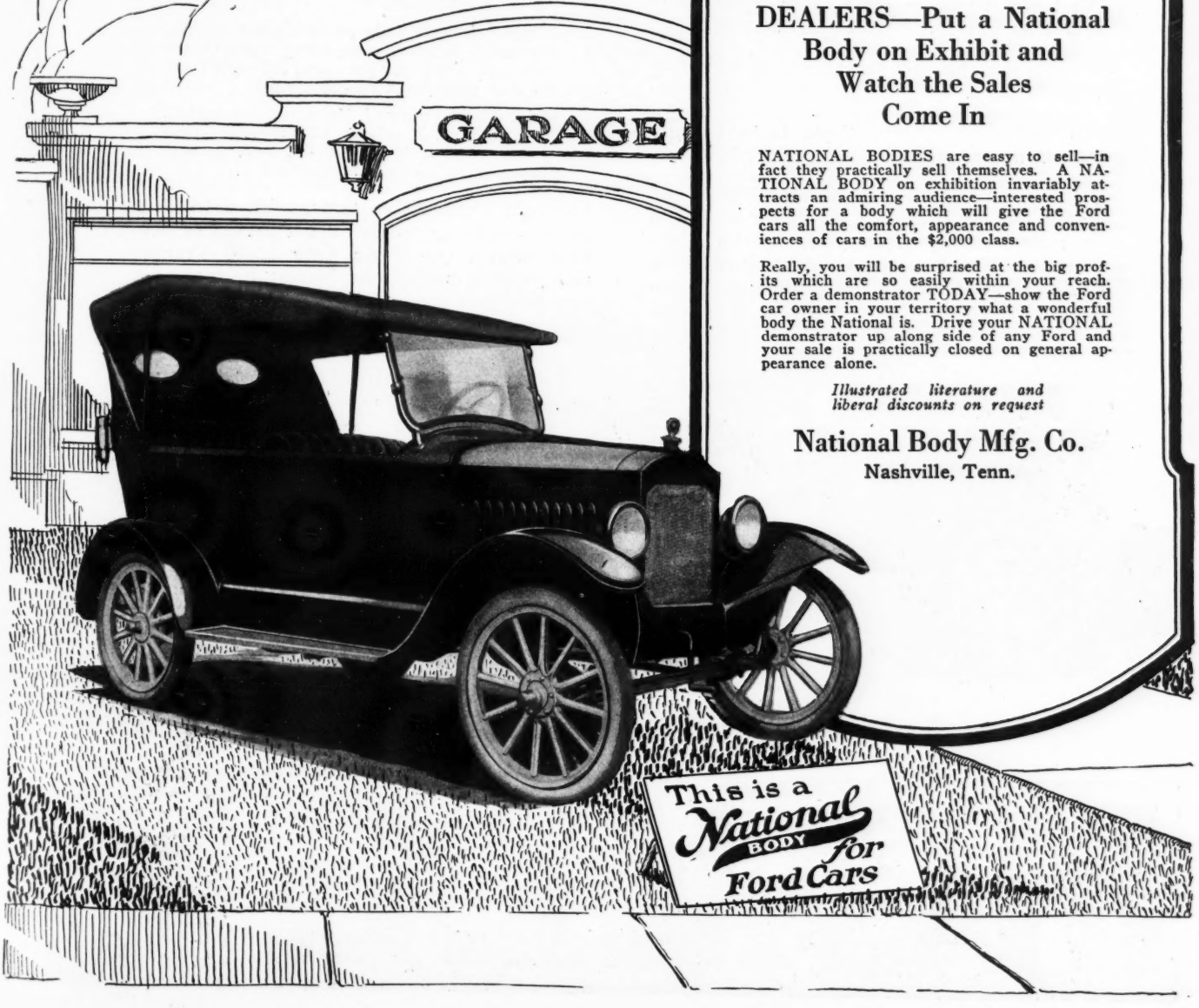
PHILADELPHIA

WASHINGTON
ATLANTA
HOUSTON

PITTSBURGH
CHICAGO
INDIANAPOLIS

ESTABLISHED 1879

National BODIES for Ford Cars



DEALERS—Put a National Body on Exhibit and Watch the Sales Come In

NATIONAL BODIES are easy to sell—in fact they practically sell themselves. A NATIONAL BODY on exhibition invariably attracts an admiring audience—interested prospects for a body which will give the Ford cars all the comfort, appearance and conveniences of cars in the $2,000 class.

Really, you will be surprised at the big profits which are so easily within your reach. Order a demonstrator TODAY—show the Ford car owner in your territory what a wonderful body the National is. Drive your NATIONAL demonstrator up along side of any Ford and your sale is practically closed on general appearance alone.

Illustrated literature and liberal discounts on request

National Body Mfg. Co.
Nashville, Tenn.

Answering the Charge That Kerosene As a Motor Fuel Is Not Successful

The Charge

So let us not deceive ourselves into thinking that we are burning kerosene successfully, for we are not. When rapid changes in drawbar load can be handled without having the engine falter, hesitate, gasp, emit volumes of unburned gas and then in a dying state, recover itself, we will have near perfection.

Motor Age, July 24, 1919

With 60,000 tractors in operation with Holley All-Fuel Carburetors, burning kerosene, we are in a position to answer directly the charge that kerosene as tractor motor fuel is unsuccessful.

Rapid changes in drawbar load can be and are being handled without the undesirable effects cited in Motor Age.

Holley All-Fuel Carburetors are operating without smoke.

We have shown in some cases equal horse power as compared with gasoline fuel.

We can run at a cost per acre approximately 40% cheaper.

We will demonstrate these facts to any tractor manufacturer.

That kerosene is being successfully burned by the Holley All-Fuel Carburetor is proved by remarkable performances of the Twin City 12-20 Tractor, with the Holley All-Fuel Carburetor as standard equipment, in numerous competitive tests during the last few months, as follows:

Sullivan, Ill., July 31, plowed 3.13 acres in 2 hours, 50 minutes; fuel consumed, 2.64 gallons per acre—greatest and speediest record among ten tractors.

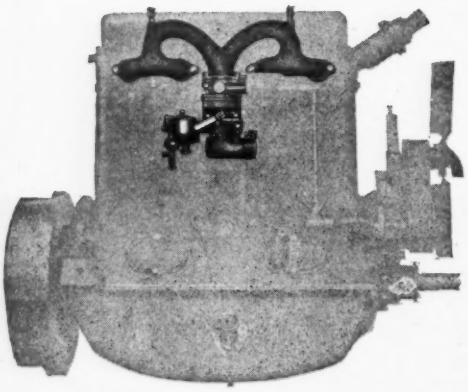
Fairbury, Ill., plowed 3.84 acres in 2 hrs. 50 min. on 8 2/3 gallons of kerosene, best record of six competing tractors.

Weeping Water, Neb., Aug. 13, led 10 competing tractors with the only perfect score on fuel economy; led with 90 per cent on points; led with lowest fuel cost per acre—33 cents.

Elmwood, Neb., only perfect score on fuel economy, led six competing tractors on points totaling 93.7 per cent; led with lowest fuel cost per acre—36 cents.

Grinnell, Ia., plowed 3¼ acres 7½ inches deep, using 6.9 gallons of kerosene—fuel cost per acre, 31 cents, the best record among eight competing tractors.

In eight competitive tests, with a total of 24 tractors competing over a period of several weeks, the Twin City 12-20 Tractor not only averaged the lowest in fuel cost per acre but showed the lowest in each individual case.



Holley All-Fuel Carburetor Installed on Twin City Twelve-Twenty Motor.

Holley Carburetor Company
Detroit Michigan
(39)



HOLLEY

How Makers of the Twin-City 12-20 Tractor Refute the Charge

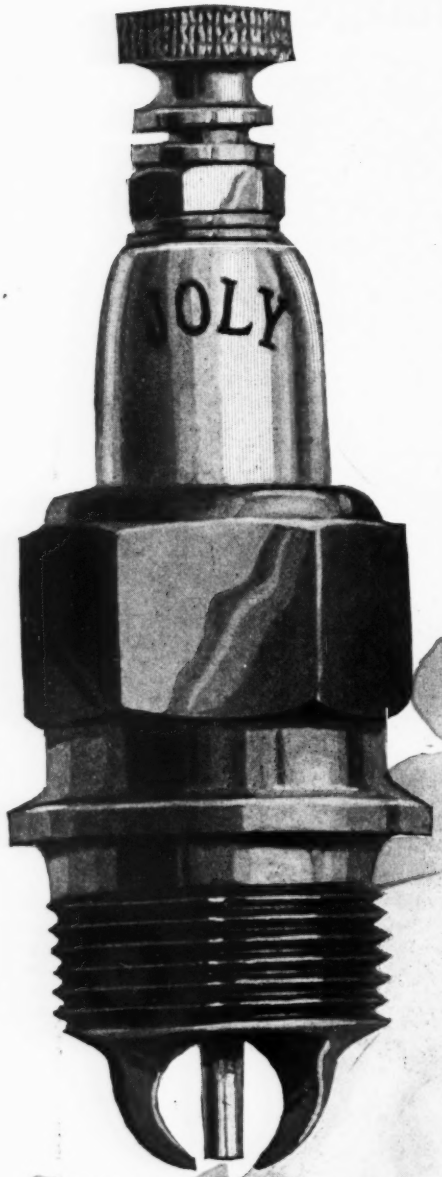


HOLLEY

A Plug Ripe

A Good Many Spark Plugs Sell in a More or Less Desultory Way Without Making Any Noteworthy Records

The Joly Spark Plugs—Over 5,000,000 of them stood firm in perfect service on every allied combat airplane during the four years of grilling war work



AND now we have acquired the American and Canadian rights to manufacture the Joly Spark Plug. We are in full production in our modernly equipped plant at Paterson, New Jersey.

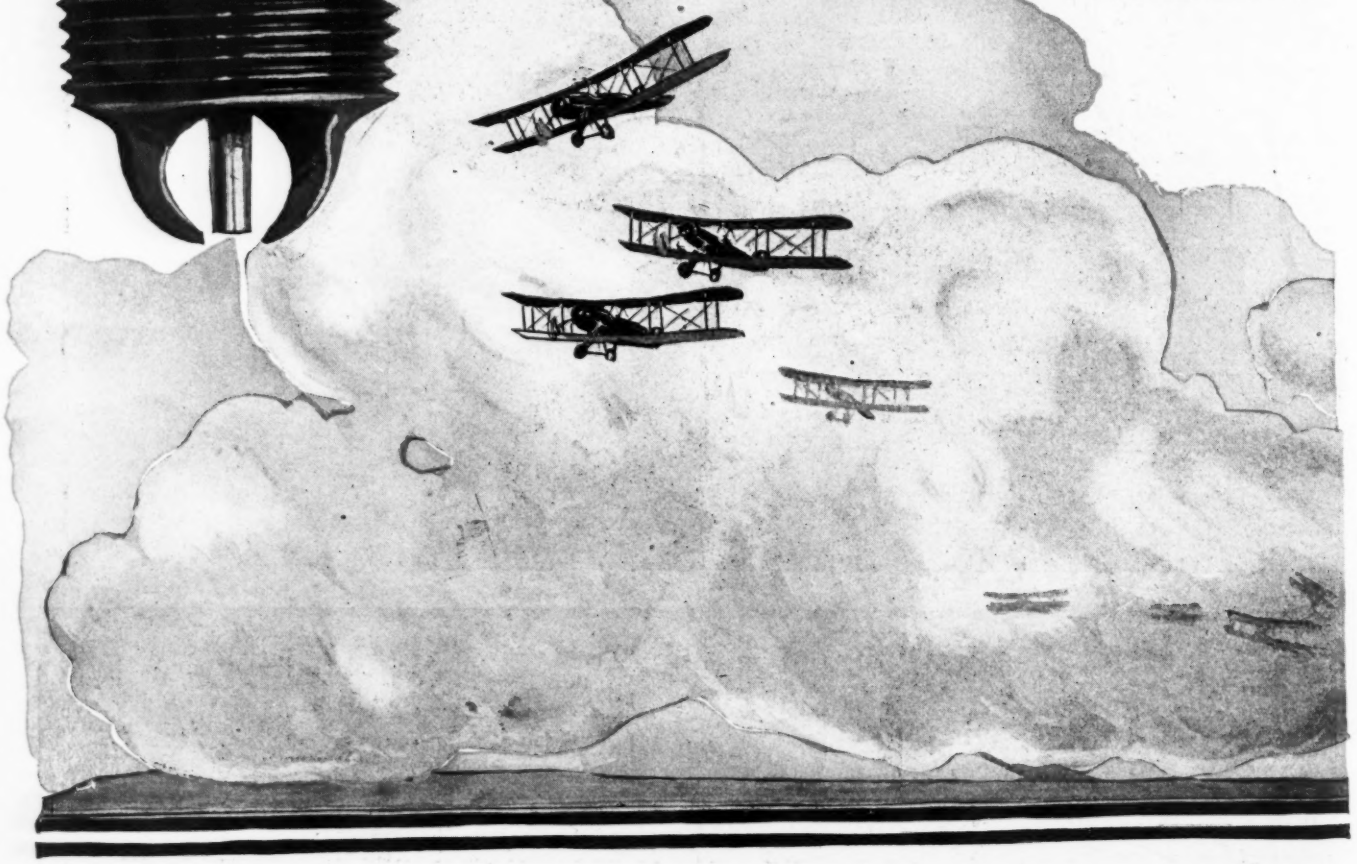
You in the trade have been looking for a plug that would send a man away satisfied—and keep him satisfied—and bring him back, not for a more satisfactory replacement, but for "another of the same kind."

Here it is—the thoroughly tested Joly Spark Plug—the one with longest record of super-endurance against the high compression and sustained speed of the plug-killing airplane motor.

This is the plug that is making the same tremendous records on American truck, tractor, passenger car, marine, gasoline and airplane engines.

In this splendid creation of design, material and careful construction lies your solution of the long-time question—

"Where can I get a spark plug line that will make, hold and increase my plug business?"



From Hard Experience

A Glance At The Detail Shown On This Page Will Prove In Cold Type And Illustration, Why The Joly Spark Plug Will Guarantee Automotive Owners Long And "Troubleless" Service.

To The Trade

A PLUG such as this, with a performance record never equalled, is worth your consideration.

The basic points of design briefly noted have made the Joly Spark Plug a creation of endurance and faultless service such as has never before been offered to the motoring public through the trade.

Our acquisition of this impressive business, with its wonderful facilities for production now operative here, marks a new era in American spark plug development.

An agency franchise for the Joly line will lead to immediate and rapid development of your spark plug business. "Records count" and we offer you a four year old brutally tested plug with millions of super-records of endurance to its credit.

IMPORTANT—Do not tie yourself up on any spark plug contract until you have investigated the Joly Spark Plug and the sales plans back of it.

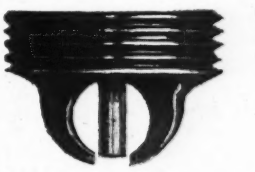
List Price $1.50 Liberal Trade Arrangements

We want your inquiries—Write or wire for Jobber and Dealer Plans

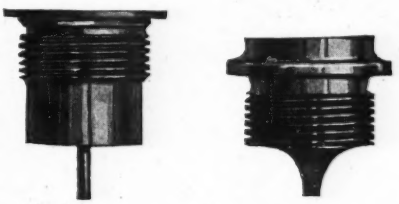
LYONS IGNITION CO.

215-219 Fourth Ave., New York

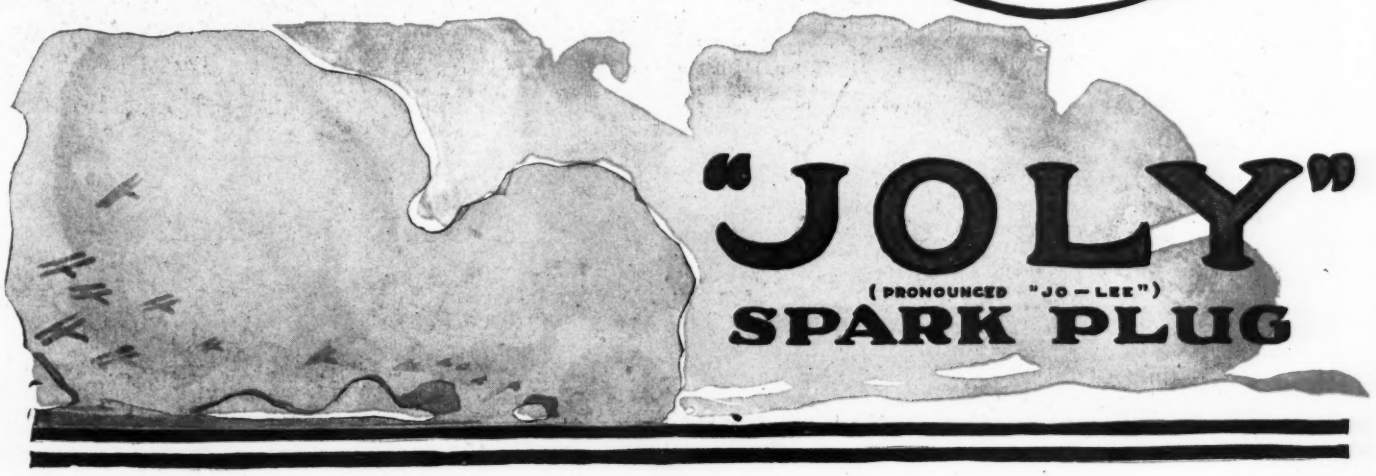
FACTORY—PATERSON, N. J.



Showing (left) the ample radiating surface of the Joly Integral fingers and heavy central electrode. (Right) ordinary "pre-ignition" type of electrodes, exhibiting cause of pre-ignition and fusing.



Showing (right) side view of Joly Plug integral finger—ordinary design on left. This comparison needs no comment here.



GARDNER

MONARCH UNIT

2 Stage

BACKED BY A 66 YEAR OLD FIRM AND AN UNLIMITED GUARANTEE

Monarch Air Compressors are being offered to the automotive trade by an organization that has designed and built high grade machinery for 66 years. Its engineers are nationally known as authorities on air compressors. Their combined study of the demands made on the average garage for compressed air has resulted in the Monarch unit.

The Monarch Unit costs you no more than any other two-stage air compressor of equal dimensions—yet it is a high grade, carefully made, precision-machined job. It is guaranteed for life by the Gardner Governor Co., a firm of unexcelled financial reputation and ability.

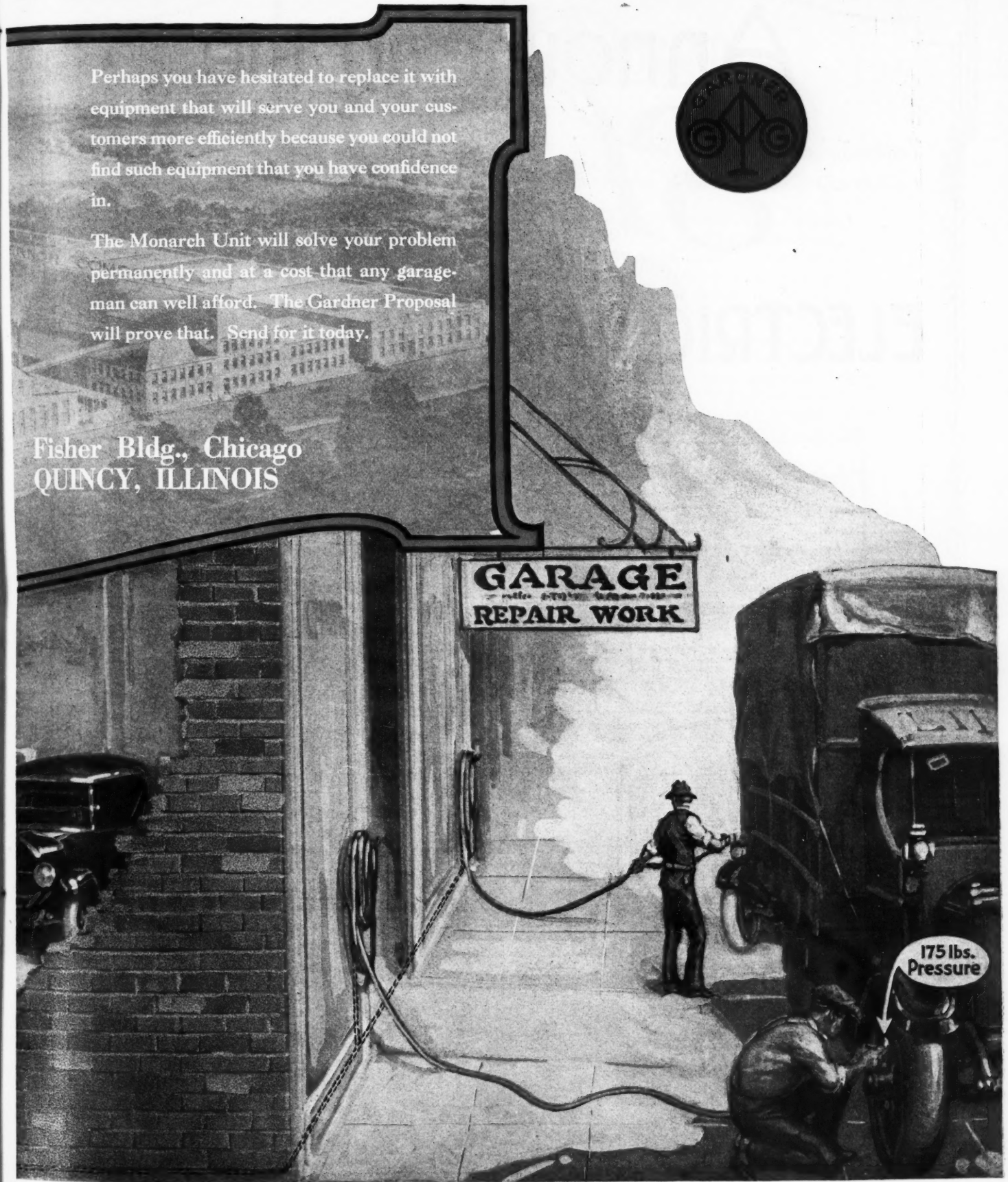
You already have an air compressor, of course. If it is not satisfactory you know why. Probably it is either inadequate for your demands, undependable or too expensive.

For compressing air above 100 pounds, the 2-stage compressor produces a much greater efficiency, at ½ the operating expense, and with a life 4 times that of the ordinary single stage compressor.

C. A. DICKERSON, *Distributor*
M'f'd. by GARDNER GOVERNOR COMPANY



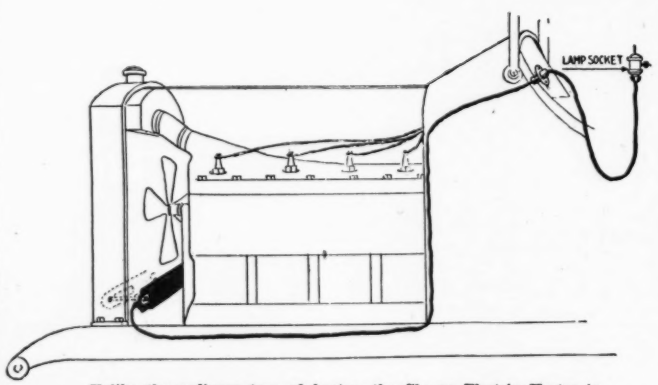
Air Compressors



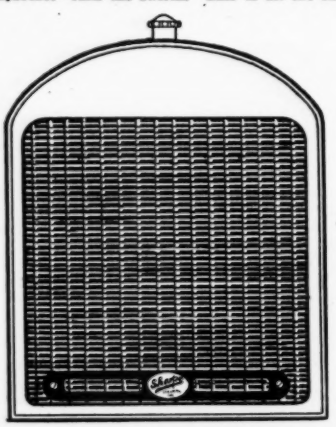
Announcing the Sharpe

REG. TRADE MARK

ELECTRIC RADIATOR HEATER



Unlike the ordinary type of heater, the Sharpe Electric Heater is permanently attached to the radiator—at the radiator base, the logical point. It cannot be lost, misplaced or stolen. The Sharpe is always ready. The hood need never be raised. Attach to any convenient lampsocket—turn the switch. This is all the effort required.



Front View Illustrating Method of Installation

Designed by one of America's foremost electrical engineers

After two years of experimentation, at last a permanently attached radiator heater that will outlast any car or truck!
And the whole secret is in the patented heating element—thoroughly practical and exceedingly durable because particularly designed for automotive use. This element is enclosed and waterproof.

The Sharpe is the only *permanently attached radiator heater.*

The Sharpe is the only radiator heater which applies heat at the BOTTOM of the radiator. It keeps the water in the radiator and water jackets continuously hot.

Ensures a quick, sure start in coldest weather without priming or warming up with consequent saving of gasoline. Prolongs life of storage battery and starter. Eliminates necessity of draining radiator and filling with hot water. Makes expensive garage heaters unnecessary.

Sold on 10-day money-back trial

For all passenger cars, trucks, taxi-cabs, tractors. Anyone can install in few minutes.

Price, $11.00, Complete

Write for circular and full information. Distributors and dealers now being appointed. Wire or write.

SHARPE ELECTRIC APPLIANCE CO.

Sales Offices: 1519 Dime Bank Bldg.

DETROIT, U. S. A.

DUTCH BRAND
TRADE MARK

Cash In On DUTCH BRAND Reputation

It Will Help to Keep the Winter Business Curve Up



Radiator-Seal
Auto Patching Cement
Rubber-Seal
Vulcanizing Cement
Carbo-Cide
Valve Grinding Compound
Auto Top and Cushion Coating
Gasket Shellac
Varni-Brite
Auto Polish
Tire Talc
Friction Tape
2 in 1 Tire Cut Filler

And other necessities for "Keeping Down the Upkeep" of motor cars.

Thousands of dealers are selling DUTCH BRAND Products—*profitably.* This line of tire and chemical necessities enjoys a *national* reputation. In fact, it is unusual to find a town where DUTCH BRAND Products are not sold.

By stocking this line of popular sellers you will be taking advantage of the sales momentum that has been growing for years. You will be selling products that are *known*—products that are *bought* by thousands of car owners in every section of the country.

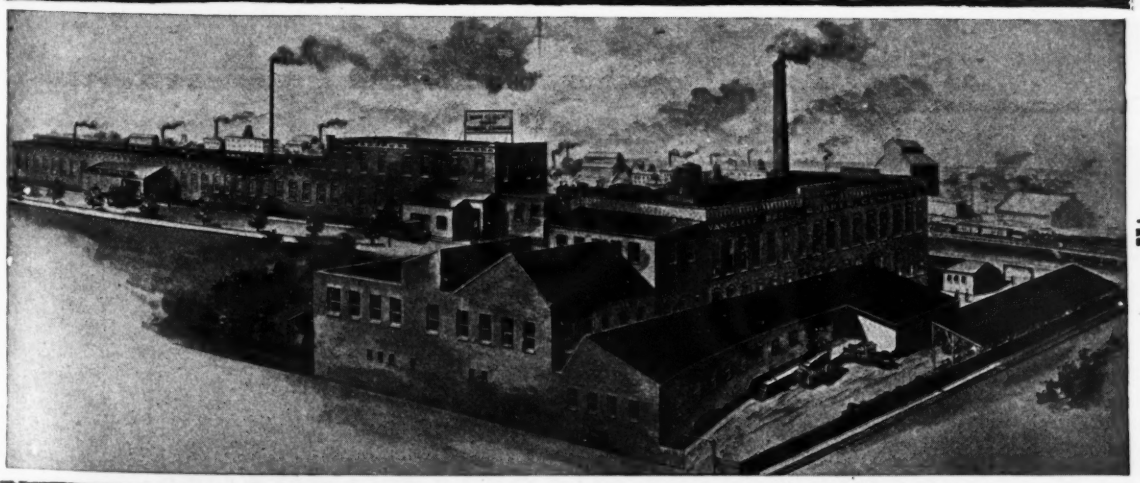
Winter business will take on a bigger meaning for you when you become the DUTCH BRAND dealer in your community. Your jobber will supply you.

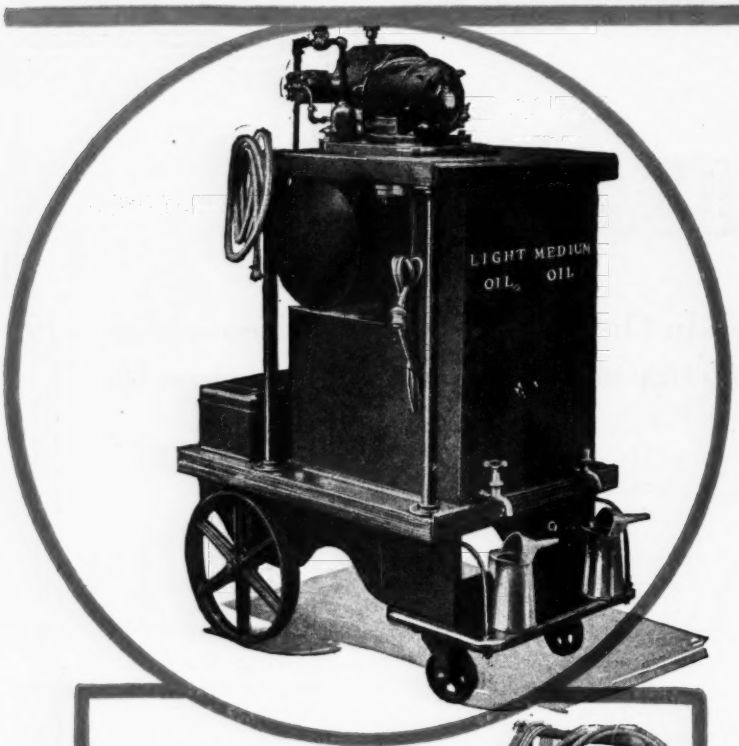
A catalog will be sent to you upon request.

JOBBERS—By becoming a link in the DUTCH BRAND chain of national distribution you are tying up with *established* success. Say the word and our representative will go into details with you.

VAN CLEEF BROS.
Manufacturers Dutch Brand Rubber Cements and Auto Chemical Specialties

Woodlawn Ave., 77th to 78th St., Chicago, Ill.





When You Buy An Air Compressor First—Consider Its Efficiency

WHAT is it going to cost you to run it? What is its upkeep going to cost? What kind of service is it going to give you?

General Air Compressors are designed for efficient service. They are built in our own factory which is equipped with the most modern machinery and is capable of turning out compressors of a quality that is second to none.

General Air Compressors are guaranteed indefinitely against defects in workmanship and material. They will give service of an exceptionally high character for many years.

The superior efficiency of General Air Compressors is directly due to the horizontal opposed two cylinder construction. They deliver two cylinder efficiency at one cylinder cost. They will inflate an average sized tire in two minutes at a rock bottom cost.

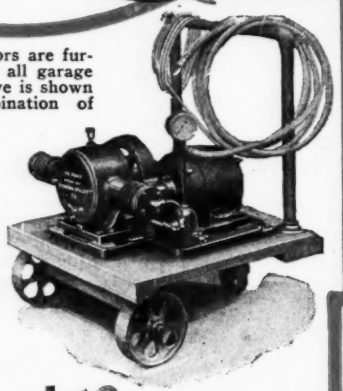
General Air Compressors are sold through exclusive distributors in limited territory. Dealers write for name of our nearest representative.

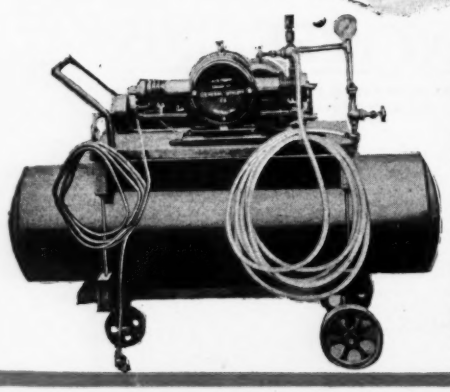
DISTRIBUTORS: We have some territory still open.

General Air Compressors are furnished with outfits to fit all garage and service needs. Above is shown Utility Model—a combination of Air Compressor, Air Tank and Oil Tanks. It is designed to remind the motorist using free air that he also needs oil.

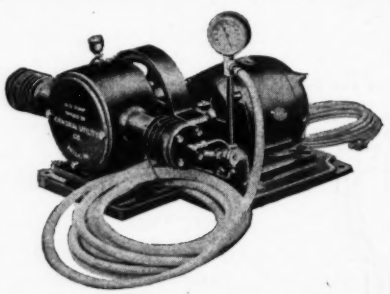
Direct Portable — Pumps cool air directly into the tire. All accessories are included in outfit.

All outfits shipped complete and ready for installation.





Portable Service Model—Gives tank service right at the car. Automatic start and stop switch is included in this model. Also furnished as a stationary outfit.



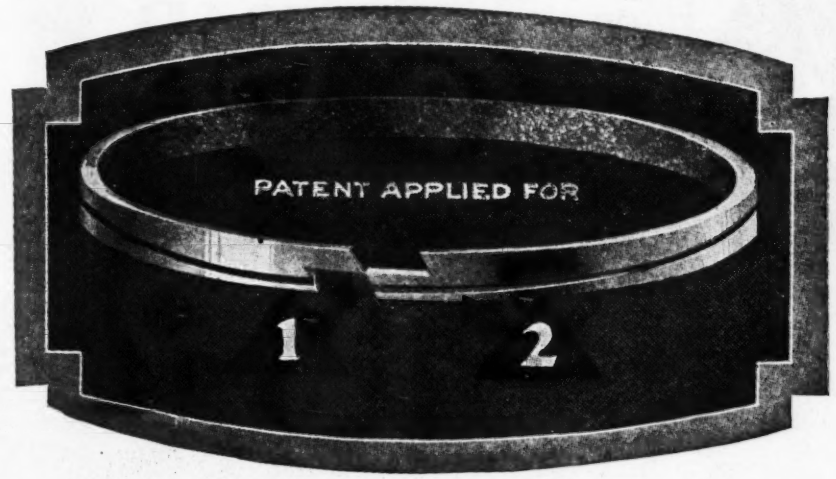
The General Two Cylinder Air Compressor direct model, delivers 3 cu. ft. of air per minute. Equipped with direct drive, half horse, ball bearings mounted G-E motor, A. C. or D. C. 110 V. or 220 V.

Two Cylinder
GENERAL
AIR COMPRESSORS

UTILITIES SALES
Sales Re
GENERAL UTI
Factory 1324 Ogden St. Philadelphia-Office 8

Utilities that Sell

PATENT APPLIED FOR







That Oil Groove Is Curved to Accomplish Five Important Purposes

IT provides lubrication at heretofore unreached points on the cylinder wall. It lessens the natural friction between the lightning cut ring and the cylinder wall. It prevents the passage of oil into the combustion chamber. It saves excess oil consumption by returning oil to crank case for further duty. The oil thus saved is so much less carbon to contend with.

In dealing with compression the lightning cut is equally efficient. It is much more than a mere combination of the old diagonal and step cuts. Expansion serves to automatically lock its horizontal cut, should the same force create a crevice in its diagonal cut.

Lightning cut rings are individually cast—not sliced from a pot casting. Thus are preserved a fineness of texture, an evenness of tensile strength and uniform expansion that cannot be obtained in any other way. A natural inside finish or scale adds to their tension or spring.

Full concentric design gives equal ring pressure against cylinder walls and lessens wear. Oil pockets, common to rings of eccentric design because of material removed and which furnish space for carbon deposits are conspicuous because of their absence.

One piece construction insures unit expansion, unit simplicity and unit strength.

Lightning cut rings make far radically better car performance. Increased power; greater mileage; fuel and oil economy and less friction and wear are resultant advantages that are evidenced in thousands of installations.

GENERAL LIGHTNING CUT PISTON RINGS

Your only regret after getting the details of our revolutionary profit-sharing plans will be that you had not protected your piston ring profits long before.



CORPORATION

...sentatives

...TY COMPANY

...New Stock Exchange Bldg., Philadelphia

Two Cylinder GENERAL AIR COMPRESSORS

...ecause They Serve

A PUSH OF THE THUMB



250 Lbs. Pressure Cleans Out the Spring Shackles and Steering Knuckles

The FELIX Oil Cup is a combined pressure and automatic feed oiling device. It **automatically** feeds sufficient oil for lubrication and need not be filled oftener than once a month. When desired, by raising cap and pressing slightly with the hand the oil is forced over the bearing surface **under pressure up to 250 lbs.,** which instantly flushes out all dirt and grit. The flushing out operation requires but an instant, is simple, easy **and clean.**



Just Lift the Cap to Fill—No Cover to Unscrew and Fall in the Dirt



The Felix Oil Cup

A Combined Pressure and Automatic Feed

overcomes all the disadvantages of grease, which soon clogs in the holes and fails to lubricate. If a shackle bolt or bearing is properly lubricated it will not squeak and will last the life of the car. If it is not it will always squeak, will soon wear away and have to be replaced.

FELIX Oil Cups are unbreakable, are dust and water proof and are fully guaranteed. The price is one dollar each.

Dealers—Supply the natural demand for perfect lubricating devices by selling FELIX Oil Cups. Our proposition is a good one. Write for details.

Felix Manufacturing Company

4437 North Clark Street, Chicago, U. S. A.

PEERLESS

It Costs No More Than the Other Kind.



Be Prepared For Dealer's Demand. Place Your Stock Order NOW.

Guaranteed Radiator for Ford Cars



Upper Tank drawn from one piece of Brass No Seams consequently No Leaks

Radiator Cap made of Special Metal Has no Rubber Top to break off

Brass Overflow Pipe

Malleable Water Connections

Heavy steel reinforcements add strength to the construction of the Radiator

Heavy steel reinforcements add strength to the construction of the Radiator

Detachable Steel Shell finished in Black Japan baked on or nickel shell if wanted

All Brass Honeycomb Type Core—Note Details for Cooling Efficiency

Heavy Wrought Iron Brackets

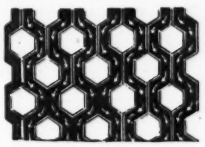
Heavy Wrought Iron Brackets

Malleable Water Connections

Seamless Lower Tank also drawn from one piece of Brass

400% more efficient than regular Tubular type radiator

PEERLESS CORE	← WHY ? →	TUBULAR CORE
5600 inches of cooling surface	⟷	Only 1211 inches of cooling surface
Only 1/16 in. flat stream very easily cooled	⟷	Large round 3/16 in. stream hard to cool
174 cubic inches of water in channels of PEERLESS CORE	⟷	Only 44 cubic inches of water in TUBULAR CORE



Cross Section of PEERLESS Honeycomb Core. Arrows Indicate Flow of Water through Core

Flexibility of Core Eliminates Damage from Freezing.

Manufactured by

The Corcoran Mfg. Co. Dept. 8. **Cincinnati, Ohio**

This Number *of*

MOTOR AGE

"The Foremost News, Service and Maintenance Magazine for Automotive Dealers."

is a sample of the many good things in store for MOTOR AGE readers.

The coming issues of MOTOR AGE will contain a fund of valuable information that will turn over many times your subscription investment of $3.00.

You must realize the advantage of being a regular member of the big MOTOR AGE family. You get your copy every week and there's no danger of missing one.

In these strenuous days of getting back to business on a firm basis it behooves us all to keep the throttle on our source of intelligent information wide open. One single new idea or suggestion obtained from MOTOR AGE may mean the saving of the whole year's subscription cost.

Give particular attention to "The Readers' Clearing House," "The Motor Car Repair-shop," "Garage Planning" department and the "Maintenance Data Sheets" in each issue of MOTOR AGE—and don't fail to act on the timely suggestions and advice given in its weekly service and maintenance articles. Careful and systematic reading of this kind keeps you advancing in your knowledge of motor cars, trucks and tractors—gives you authoritative counsel on distribution, sales, service and maintenance problems.

52 Big Helpful Numbers of MOTOR AGE for $3

If you are not realizing the advantages of being a regular member of the MOTOR AGE family, let it be your counselor and guide hereafter—don't wait any longer to join—do so right now by using the application blank herewith:

MOTOR AGE
MALLERS BLDG., CHICAGO, ILL.

Date,....., 1919

Gentlemen—

Enclosed is my $3.00 for which enter my membership in the Big MOTOR AGE Family.
Send a year's supply or 52 numbers of MOTOR AGE to:

Name .....

Address .....

WRITE PLAINLY AND ATTACH YOUR BUSINESS CARD OR LETTERHEAD FOR VERIFICATION

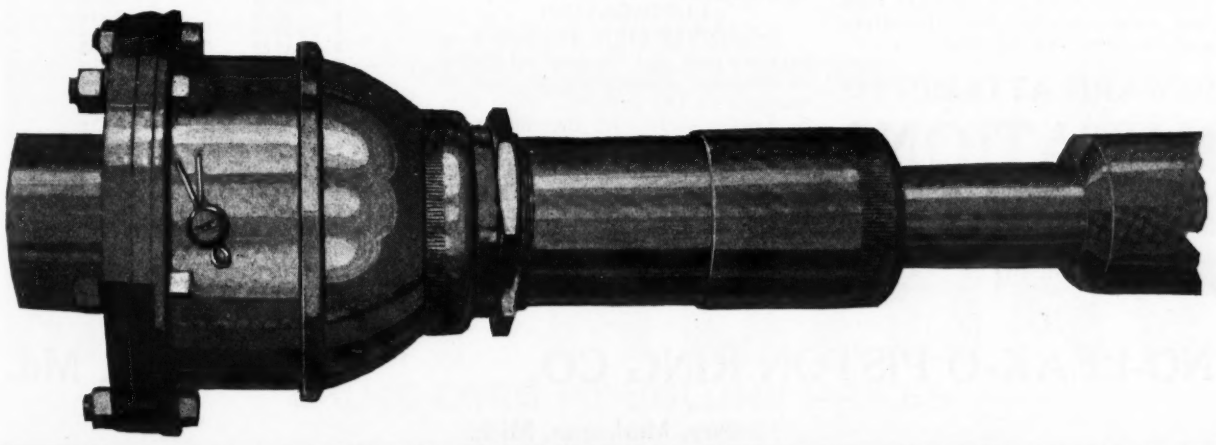
"STERLING"
UNIVERSAL JOINTS

Durable, strong, properly lubricated —with unusual features we want to tell you about.

Designed for trucks and passenger cars.

THE BEARINGS COMPANY OF AMERICA
LANCASTER, PA.

Western Sales Office:
1012 Ford Bldg.,
Detroit, Mich.



ON THE MARKET FIVE YEARS

=

OVER 20,000,000 IN USE

=

POPULAR BECAUSE THEY MAKE GOOD

"NO-LEAK-O"



Be sure you get the genuine NO - LEAK - O PISTON RINGS, wrapped in oil paper, put up in square cartons bearing the trade mark—

NO-LEAK-O and the SEAL in the RING

Reputation Through Actual Service

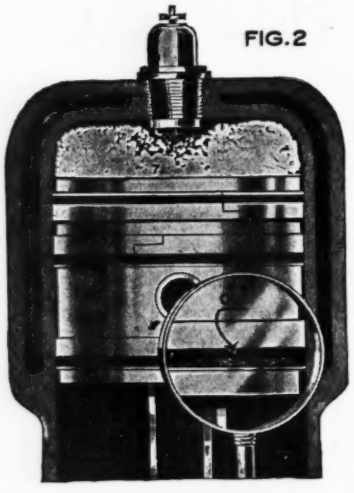
WHY MOTORS LEAK—HOW TO PREVENT IT

The cylinder walls of all gasoline motors warp from expansion and contraction; they also wear. As a piston ring cannot conform to these irregular surfaces, the explosion and other forces destroy the seal of oil as it passes over these places; the gas escapes and oil passes up.

"THE RING WITH A REASON" WILL PREVENT IT

"NO-LEAK-O" Piston Rings have a 45 degree angle-groove full of oil between the ring and the cylinder wall, which pulsates as the piston moves up and down. This pulsation KEEPS a film of oil between the ring and the cylinder wall, REGARDLESS of these warped or worn places on the cylinder wall. The motor maintains maximum power all the time.

FIG. 2



The oil is retained in the groove between the ring and cylinder wall just where needed for lubrication and to form the oil Seal.

BEWARE ATTEMPTED

IMITATIONS

NO-LEAK-O

PATENTED

HOW NO-LEAK-O RINGS ARE MADE—IMPORTANT

"NO-LEAK-O" "oil SEAL ing" piston rings are made from a special formula of close-grained tough gray iron, a few points softer than proper cylinder metal. Concentric, accurately finished. Individually cast, retaining on the inside the skin of the casting, which insures **long life** and lasting resiliency. Made under patented processes, by which even tension on the cylinder wall is secured, superior to any other process of manufacture.

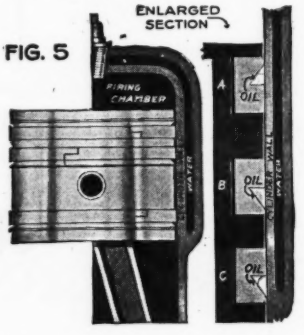
"NO-LEAK-O" rings are not ground, but turned, leaving the tool marks. They will fit themselves quickly. Easy to install—not liable to break. Every full set, when properly installed, guaranteed to give satisfactory service or money refunded.

COAL OIL INJURIOUS TO LUBRICATION

By REVERSING the top ring (groove part up) the coal oil that is in gasoline, attempting to pass, is trapped in the groove. (See Fig. 5, Letter A.) On the firing or power stroke it is drawn into the heated firing chamber. It will then be exploded into power, or go out the exhaust pipe—not down into the oil pit, to injure lubrication.

"NO-LEAK-O" Restores Power in Old Motors Without Reboring.

FIG. 5



A ring made under any other process or a groove cut in any other shape or position, or in any other manner will not produce results that "NO-LEAK-O" Rings do.

STOCK SIZES AND PRICES

All sizes up to and including	3	3-4	x1-4		$ .50
3	3-4	x9-32	"	3	3-4 x7-16 .55
3	13-16	x3-16	"	3	15-16x1-4 .60
4		x3-16	"	4	1-8 x1-4 .65
4	1-8	x9-32	"	4	1-4 x1-4 .70
4	1-4	x9-32	"	4	3-8 x3-8 .75
4	1-2	x3-16	"	4	3-4 x1-4 .80
4	3-4	x9-32	"	4	15-16X1-4 .85
5		x3-16	"	5	1-16x1-4 .90
5	1-8	x1-4	"	5	1-2 x1-2 .95
5	5-8	x5-16	"	5	3-4 x3-8 1.00
6		x1-4	"	6	x5-16 1.10
6		x3-8	"	6	x1-2 1.15
6	1-4	x5-16	"	6	1-4 x1-2 1.20
6	1-2	x5-16	"	6	1-2 x1-2 1.25
7		x3-8	"	7	1-2 x3-8 1.50

For larger sizes see Price List. Special Sizes and Prices Given on Application.

When ordering, give bore of cylinder, width of ring, or the year, model and make of car.

NO-LEAK-O PISTON RING CO. Baltimore, Md.

Factory, Muskegon, Mich.

On Exhibition Congress Hotel Parlor, Nov. 3rd to 8th

KENOSHA
NASH
WISCONSIN

Nash Volume Production Makes Nash Prices Possible

NASH prices for both passenger cars and trucks would have to be much higher right now were it not for the fixed policy of building in such quantity that dealers are able to do a volume business—to sell these value products at most attractive volume prices. The success of this policy is evidenced by the large and ever growing demand from all sections of the country.

Nash Passenger Cars

5-Passenger Car, $1490 2-Passenger Roadster, $1490 Sedan, $2575
4-Passenger Coupe, $2350 7-Passenger Car, $1640
4-Passenger Sport Model, $1595

Nash Trucks

One-Ton Chassis, $1650 Two-Ton Chassis, $2250
Nash Quad Chassis, $3250

Prices F. O. B. Kenosha

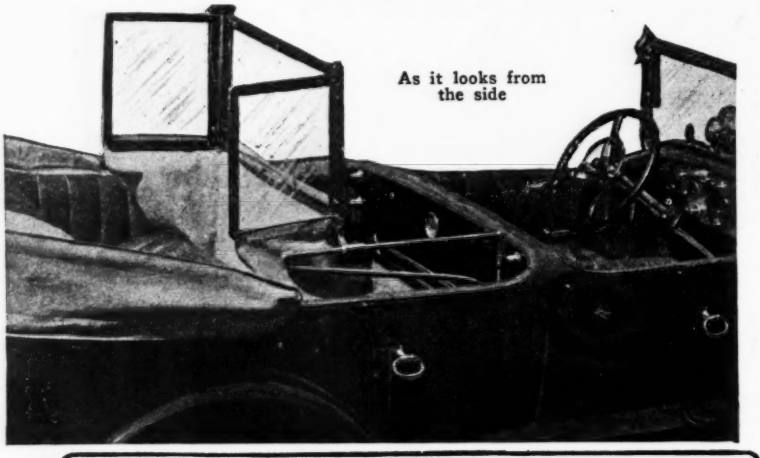
The Nash Motors Co., Kenosha, Wis.

Manufacturers of Passenger Cars and Trucks
Including the Famous Nash Quad

NASH MOTORS

VALUE CARS AT VOLUME PRICES

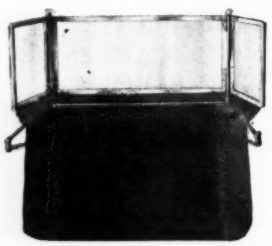
It's Because The New Perkins' Tonneau Windshield Can Be Set at Every Conceivable Angle that New York Has Adopted It



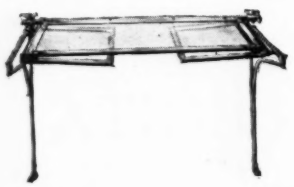
As it looks from the side

On the smart cars on "The Avenue"—the Locomobile, the Packard, the Pierce Arrow and other cars—On the foreign cars on "The Drive"—you find the New Perkins'. Even the Queen of Denmark has one on her new car. European manufacturers are clamoring for it.

Why?







Because, as these illustrations show you, the Perkins' Tonneau Windshield can be positively adjusted at **any** angle. Each moveable part of this windshield operates independently of every other part. The Center plate, with side wings at **any** angle, can be moved closer to the occupants of the tonneau, than any other windshield on the market.

The Perkins' Tonneau Windshield is designed to overcome draughts and wind pressure on any car. Nearly every car provokes a different angle draught. The front windshield, wheel base and other features of motor cars cause this wide variation in angles and the only way to meet such variations, to give your car customer absolute protection against them with a non-rattling, positive, tonneau windshield is to sell them a Perkins'.

In finish there isn't a windshield made that can compare with it. All parts are made of heavy tubular metal, heavy nickled—or finished and rubbed in any color desired to harmonize with the car. The side wings and center shield are fitted with the best 3-16 plate glass, with oversized metal sashes to protect it against sudden shocks. The metal tubes are reinforced at all strategic points and the windshield is adjusted by an easy, simple turning of a substantial, four-way locking, thumb screw that won't jar loose. Over-all spread of 65 inches.

Every Perkins' Tonneau Windshield is sold with a high grade, attractive, waterproof curtain that is applied with simple dot catches. When lowered out of place the Perkins' doesn't take up any more room than an ordinary robe on your cowl rack. It can be attached to any car in a remarkably short time and if it doesn't give your customer complete satisfaction—we'll refund his money any time.

The New Perkins' Tonneau Windshield is now being sold by the majority of high grade dealers in New York City. It is not a cheap product but a quality device in every detail. We have requests from all sections of the country from car owners who have seen our shield in New York or heard about it. It is our intention that this windshield shall be available to owners of high priced cars in all sections of the country. Territorial agencies are now being established. If you are interested in handling "extra equipment" that means a most liberal profit, write now for prices and illustrated literature.

PERKINS TONNEAU WINDSHIELD COMPANY, Inc.

1931 Broadway, New York City

PERKINS TONNEAU WINDSHIELD



Peerless Gasket Shellac

One of the leaders in our PEERLESS AUTOMOBILE SPECIALTIES which is being sold in large quantities all over the Country to leading Jobbers and Dealers of Automobile Supplies, also to Garages and Repair Men.

For a perfect job a gasket shellac must be heavy bodied, go in tact quickly. To do this it must be an alcohol product. Is not affected by gasoline. All points which make a perfect sealer are contained in Peerless Gasket Shellac. Made for practical men.

OTHER

Peerless Automobile Specialties

ARE

Mohair Top Dressing
Leather Top Dressing
Lining Dye
Cushion Dressing
Lamp Enamels
Extra Fine Black Japan
Jet Black Fender Japan
Cylinder Enamels
Tire Paint
Battery Box Black
Carbon Remover
Rim Paint
Ford Top Dressing
Body Polish
Touch-Up Black
Liquid Wax
Mirroroid

Eight Color Finishings

Yellow	**Blue**
Straw Color	**White**
Green	**Gray**
Red	**Black**

Read What One Jobber Writes About PEERLESS GASKET SHELLAC

June 13, 1919.

COLUMBUS VARNISH CO.,
Columbus, Ohio.

Gentlemen:

Confirming the writer's statement regarding your Peerless Gasket Shellac, we have no desire for publicity, yet we feel that we are only doing this article justice in stating that it is one of the best shellacs that we have ever handled.

We never knew what business could be gotten on shellac until we started selling this line and don't hesitate in saying that any jobber will increase his sales if he handles your Peerless Gasket Shellac.

Yours very truly,

President.

(Name of Jobber furnished on request)

For all kinds of Gaskets, whether of copper, rubber, asbestos, felt or paper.

Put up in gallons, half-gallons, quarts, pints, half-pints and 2-oz. bottles with swabs, so that you can order in sizes most convenient to your use.

1 Gal., $6.00; ½ Gal., $3.15; Quart, $1.65; Pint, $0.90; ½ Pint, $0.50; 2-Oz., $0.25

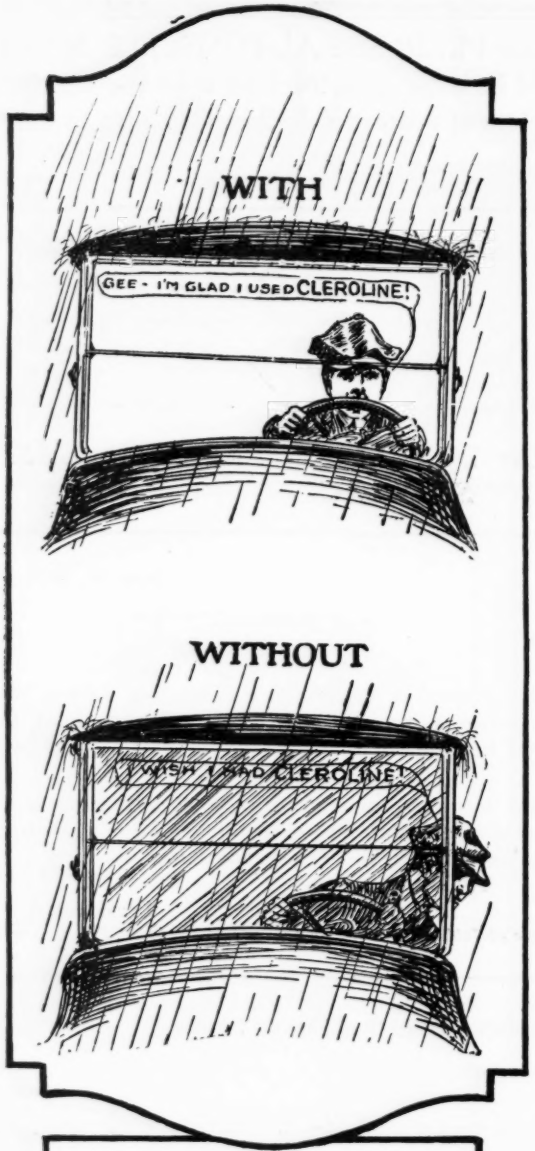
Dealers and Garages, order from your jobber today. If his stock has not arrived, send direct to us and we will see that you are supplied.

MADE ONLY BY

THE COLUMBUS VARNISH COMPANY

COLUMBUS, OHIO **U. S. A.**

Cleroline Keeps Your Windshield Free From Rain, Sleet or Snow



Not a grease, not a soap, but a chemical compound. Requires no mechanical device.

Cleroline the new chemical compound which is easily applied to any windshield with a clean dry cloth, sponge or piece of tissue paper, repels water in any form.

Gives Perfect Vision

One application of Cleroline on your windshield will last for many hours through the most severe rainstorm. No matter how hard the rain, sleet or snow beats on the windshield it will not stick. Fog or mist likewise do not adhere to a glass treated with Cleroline. You can drive safely because you have perfect vision.

Will Not Streak

Cleroline is a thin fluid without any thick, cloudy, greasy substance. After applying it to any glass material it leaves the surface clear and clean. Water cannot cut through the clear coating it leaves nor make a streak.

Insures Safety, Comfort, Protection

Every motorist feels safe behind a windshield on which Cleroline has been applied because "all roads are clear with Cleroline."

Big Sale for Dealers

Dealers, here is a real motor accessory that will sell on sight. Display a dozen cans of Cleroline in your window or place our display card on your counter and your sale is half made.

Cleroline retails for 75c. Enough in each can for about 150 applications. You not only make a generous profit but win a permanent customer. If your jobber cannot supply, write direct. See our exhibit at N. Y. Auto Show.

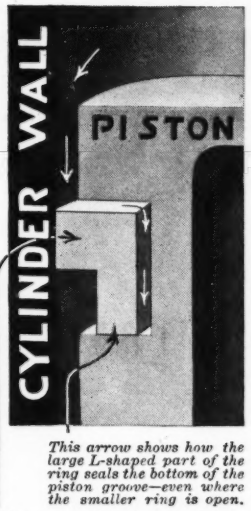
Manufactured by

THE CLEROLINE CHEMICAL COMPANY, INC.

507 Fifth Ave., New York

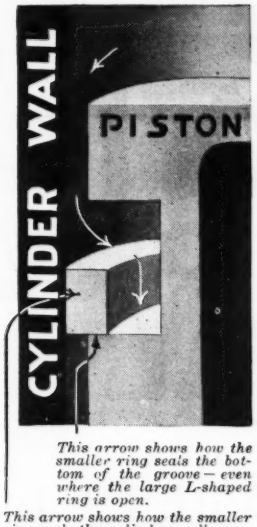
CLEROLINE

TRADE MARK REG.



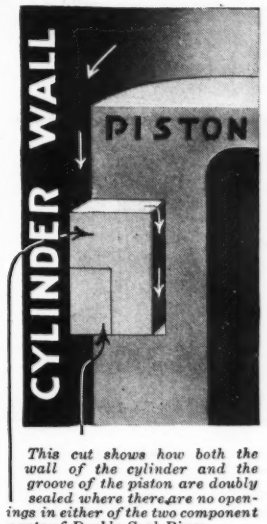
This arrow shows how the large L-shaped part of the ring seals the bottom of the piston groove—even where the smaller ring is open.

This arrow shows where the L-shaped part of the ring seals the wall of the cylinder.



This arrow shows how the smaller ring seals the bottom of the groove—even where the large L-shaped ring is open.

This arrow shows how the smaller ring seals the cylinder wall—even where large L-shaped ring is open.



This cut shows how both the wall of the cylinder and the groove of the piston are doubly sealed where there are no openings in either of the two component parts of Double Seal Rings.

Dr. Kibbie and His Overland

It wasn't living up to the fine reputation of its kind—that old Overland of Dr. Kibbie's. It wouldn't climb anything around Fort Worth except on low. Its gasoline record looked as if there were a leak in the gas tank. Its oil bill was a caution. He did what anybody would do under the circumstances; he had the valves ground, the cylinders cleaned, and the motor tuned. But things didn't change much.

Right after a big automobile race in Texas he heard from an engineer friend that five of the winners used Double Seal Piston Rings to increase compression, power and speed. Dr. Kibbie thought he'd try them. He had his car overhauled again and the Double Seal Piston Rings put on every piston. The first time he took that Overland out he was surprised.

It certainly took the hills on high; and when the gas and oil mileages were checked up they proved to be twice as much per gallon as ever before. Of course the doctor couldn't quite believe that it would last.

It seemed too good to be true. But six months later, when we saw him again, he said that the car was just as good on the hills—and the gas and oil bills were just as low—as on its first Double Seal day.

Thousands of other car owners say similar things about Double Seal Rings. Some of them had Double Seals put into old cars whose cylinders were worn, others into new cars whose motors somehow weren't just right, others had engines that "killed" annoyingly, others just had the usual trouble of too much carbon and too few miles per gallon.

Double Seal Rings are taking care of them all. Ask your garage man about them—and send for our booklet, "Keep Upkeep Down," giving the reasons why.

DOUBLE SEAL RING COMPANY

General Sales Office: 1517 Michigan Avenue CHICAGO

DOUBLE SEAL
PISTON RINGS

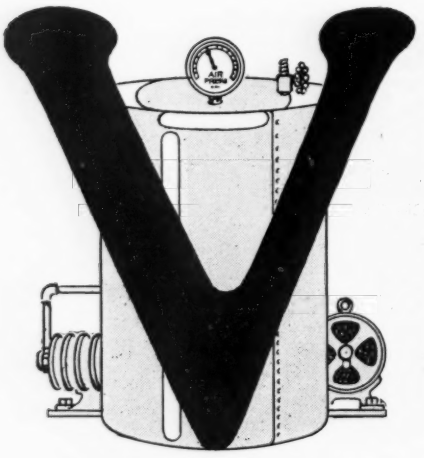


Keep Upkeep Down

If your jobber, dealer or garage does not carry Double Seal Rings, address our nearest sales branch. Each branch carries in stock *all* sizes of rings

SALES BRANCHES OF THE DOUBLE SEAL RING COMPANY

Atlanta, Ga.....66½ N. Forsyth St.
Baltimore, Md...1710 N. Charles St.
Boston, Mass.....107 Massachusetts Ave.
Buffalo, N. Y.....1377 Main St.
Chicago, Ill.....1517 Michigan Ave.
Cleveland, O.....1841 Euclid Ave.
Dallas, Texas.....208 Browder St.
Denver, Colo.....430 Eighteenth St.
Detroit, Mich.....415 Grand River Ave.
El Paso, Texas.....412 Myrtle Ave.
Fresno, Cal.....1922 Tuolumne
Ft. Worth, Texas..316-328 Lake St.
Houston, Texas.....1212 Main St.
Kansas City, Mo.....214 E. 17th St.
Little Rock, Ark...414 Louisiana St.
Los Angeles, Cal.....603 W. Pico St.
Memphis, Tenn.....128 Monroe St.
Milwaukee, Wis.....160 Mason St.
Minneapolis, Minn.....825 Hennepin Ave.
New Orleans, La.....808 St. Charles St.
New York, N. Y.....1834 Broadway
Oklahoma City, Okla.....423 N. Broadway
Omaha, Nebr.....310 S. 19th St.
Pittsburgh, Pa.....206 Werner Bldg. Hiland and Baum Streets
Sacramento, Cal.....1016 J. St.
San Antonio, Tex.....314 Kampmann Bldg.
San Francisco, Cal.....1124 Polk St.
Seattle, Wash.....1213 Pine St.
Stockton, Cal.....106 N. California St.
Waco, Texas.....104 S. 4th St.
Windsor, Ont., Can.....19 E. Sandwich St.



VELTUM PNEUMATIC VALVE GRINDER

Speed! With Perfect Control

The Veltum does the job in half the time. No wonder it has become so popular! Repairmen *want* a machine that cuts down time. Right now there are over 10,000 in actual use.

Do You Know of Any Other Valve Grinder With Features Like These?

Speed is under control of operator.

Any speed from 50 to 1000 strokes per minute, making it unnecessary to go over valve second time.

Does the entire job on a valve without stopping.

Operates on 15 to 500 lbs. of air *from the air tank you now have.*

Plenty of power to grind *any* size valve.

Grinds valve cages as well as valves.

Fits over-size valve stems into valve guides.

Quickly relieves stuck valves.

Does very delicate work, such as grinding carburetor float valve stems and fuel system valves.

Grinds valves that have no provision for tool to fit in head.

Grinds eighth valve on Ford engines.

All castings are made of aluminum, which gives the machine unusual lightness.

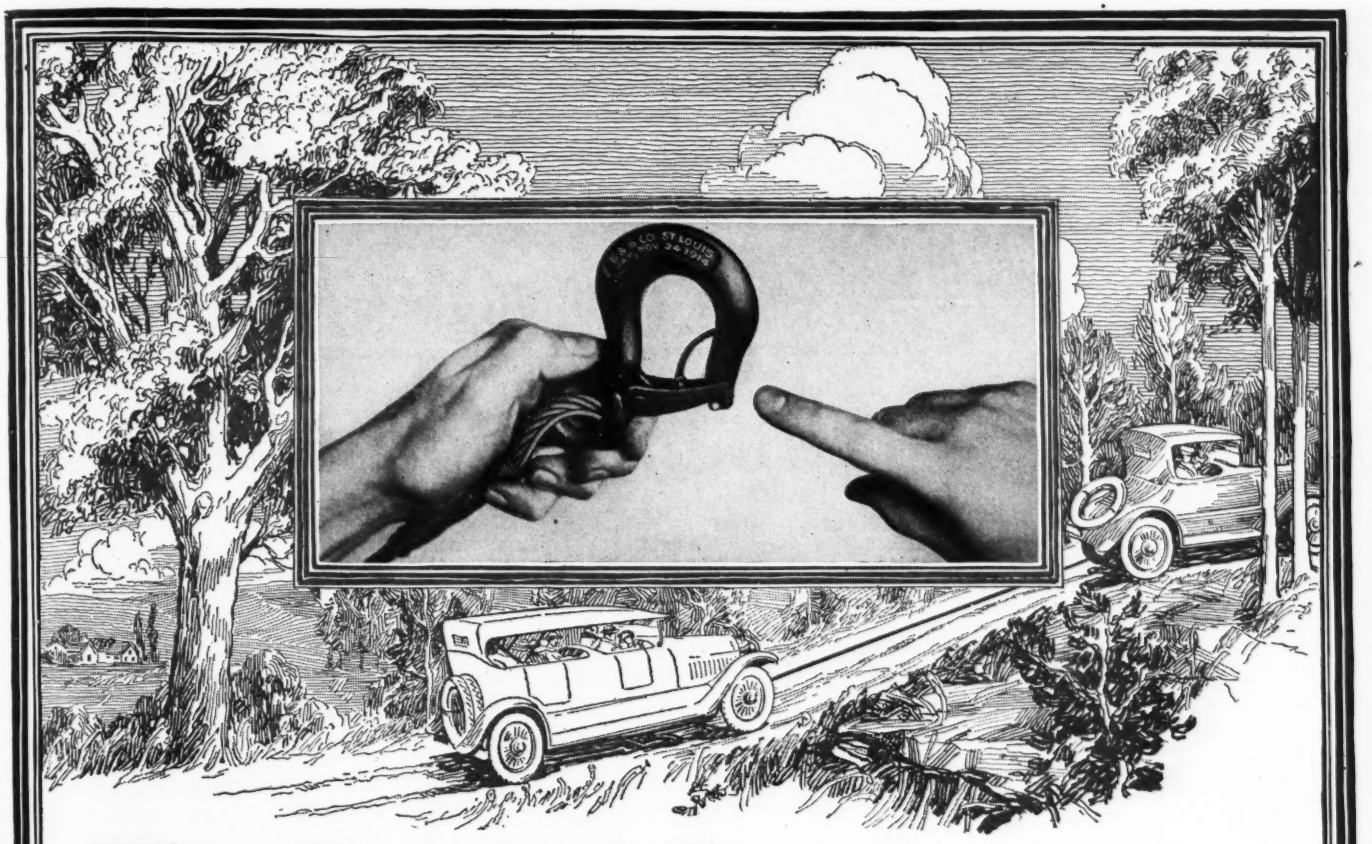
Ask Your Jobber About The Veltum

All prominent jobbers stock the Veltum. Order yours today

PRICE $22.50

WARNOCK-WIRTH COMPANY
Dept. of Sales,
624 S. Michigan Ave.,
Chicago Illinois





This Patented Feature Makes Basline Autowline The Super-Efficient Towline

BASLINE AUTOWLINE is the "Little Steel Rope with the Big Pull." Made of reliable Yellow Strand Wire Rope. Snaps on instantly and securely with patented snaffle hooks. Retail price, east of Rockies, $5.80. Good profit for *you.*

POWERSTEEL AUTOLOCK, another necessity, foils thieves. Also made of Yellow Strand Rope, with unpickable spring lock. Retails at $2.35, east of Rockies.

POWERSTEEL TRUCLINE, for heavy towing, retails, east of Rockies, at $11.30 with *plain hooks;* $12.75 with snaffle hooks.

All three are Nationally Advertised money-makers for *you.* Write for details today.



BRODERICK & BASCOM ROPE CO., ST. LOUIS New York

Manufacturers of Celebrated Yellow Strand Wire Rope

A30

What the Balance Wheel is to the Watch
The Pierce Governor
Is to the Motor Truck



TRUCK efficiency is not measured by horse power. It is measured by the truck's capacity for uninterrupted and economical performance. Any factor responsible for delays, accidents, or excessive upkeep cost defeats the very purpose for which the truck was purchased.

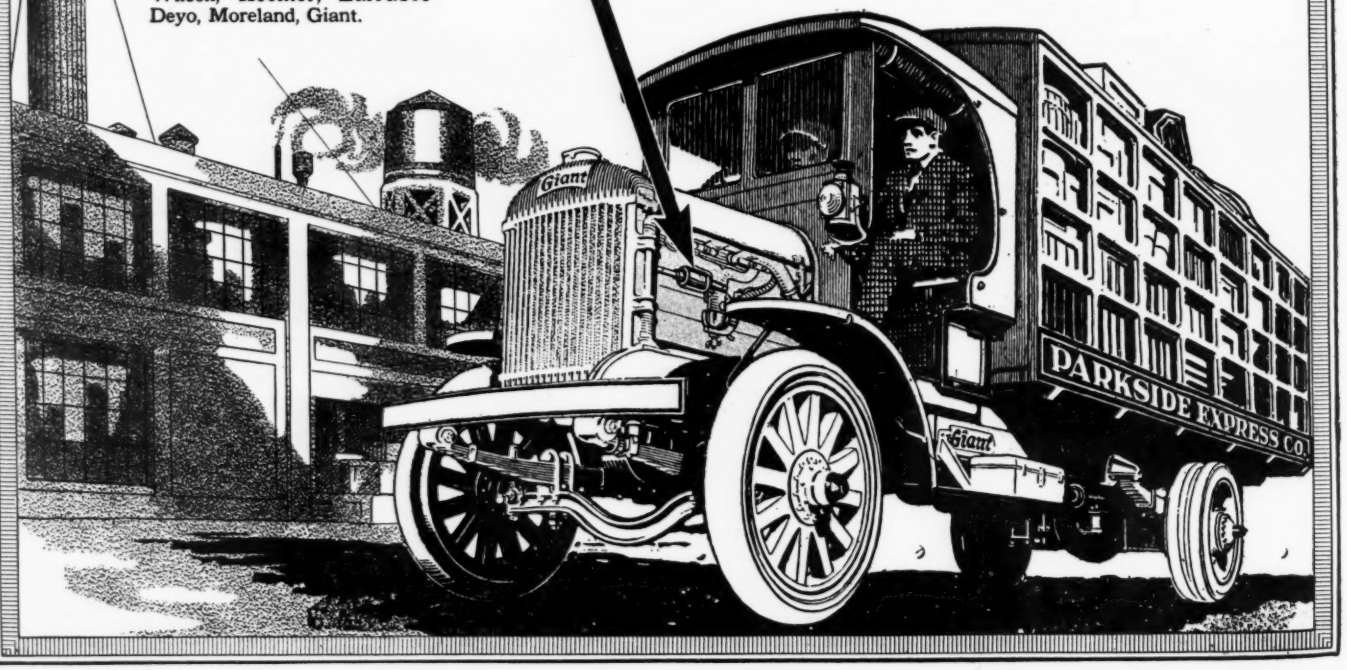
The Pierce Governor automatically provides a more perfect control of the truck speed than can ever be attained by the most careful and conscientious driver. As a result, the life of the truck is increased several years and the upkeep cost reduced fully one-half. That's why Pierce Governors have been made standard equipment on ninety-one of the best makes of motor trucks.

Look for a Pierce Governor on the truck you buy. It's a guarantee of efficient and economical service.

You Can Judge Pierce Governors by the Manufacturers Who Use Them

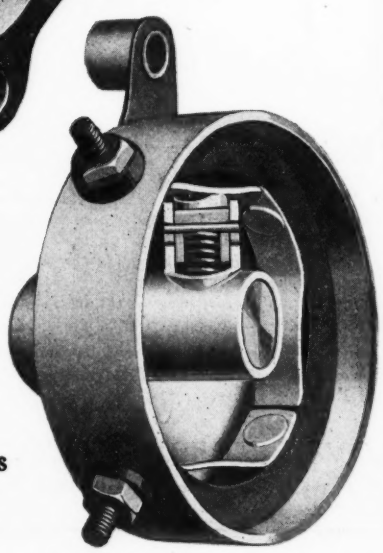
Here are a few of the ninety-one makes of trucks on which Pierce Governors are standard equipment—Selden, Maccar, Gramm-Bernstein, Diamond T, Indiana, Oneida, Velie, Paige, Signal, Gary, Master, Armleder, Dart, United States, Grant, Patriot, Superior, Nelson-Lemoon, Stewart, Kissel, Wilson, Kleiber, Commerce, F. W. D., Atterbury, Wilcox, Koehler, Larrabee-Deyo, Moreland, Giant.

THE PIERCE GOVERNOR COMPANY
"WORLD'S LARGEST GOVERNOR BUILDERS"
ANDERSON - INDIANA





Price
$6.50



Thomas
Timer
$1.50

Thomas Timer Elevator corrects all ignition trouble arising from the Timer. Compares favorably with the best ignition systems on the highest price cars. Can be installed in 20 minutes.

DEALERS

All Ford Owners are Thoroughly Sold on This Elevator at Sight

The Thomas Timer Elevator

The Thomas Timer Elevator corrects ignition troubles by lifting the Timer up where it remains clean and is easy to get at.

By employing the Thomas Elevator, the wiring is overhead—where it belongs—and compares favorably with the most expensive ignition systems. The Thomas Timer Elevator can be installed in 20 minutes without any special tools. It is not necessary to remove the radiator. *Any Timer made to fit a Ford will fit the Thomas Timer Elevator without making any changes.*

THE THOMAS TIMER

Over a quarter of a million now in use

The Thomas Timer employs the wipe contact principle, which is recognized in the electrical field as being the most satisfactory. Contact is always made at exactly the right time, thereby assuring four perfectly balanced explosions. An outstanding feature of the Thomas Timer is the fact that worn parts can be replaced in a few minutes for a few cents, which is not practical with a roller type Timer.

The Thomas Timer is guaranteed for one year from date of purchase.

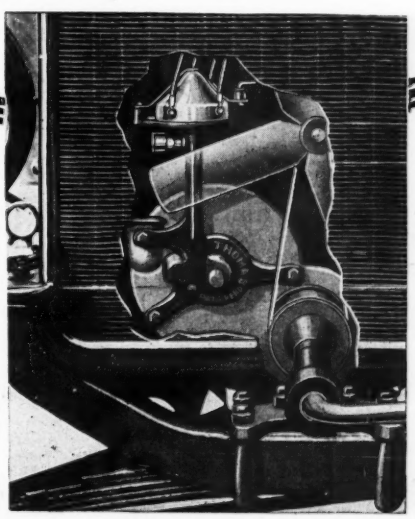
THOMAS Products Are Sold Through Jobbers

Thomas Andrews Corporation - - Chicago

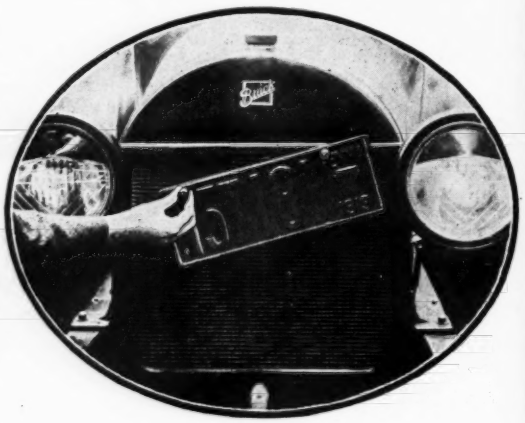
Department of Sales, 624 Michigan Ave., Chicago
Factory, Waukegan, Illinois

Thomas
Timer Elevator
ADVANTAGES

1 Ease of installation—in 20 minutes.
2 Simple in construction—fits any timer.
3 Protects against oil, dirt, grease and water.
4 Allows overhead wiring.
5 Machine-cut, spiral hardened steel gears.



THE LAMBERT License Plate Holder



January 1st

is license changing time, when license plate holders will be in great demand by every car owner.

Mr. Dealer—Now is the time for you to prepare for your share of this business.

There's no better license plate holder on the market than the Lambert License Plate Holder—Made of the very best grade of steel—the one piece—finished in nickel or black, as you prefer—can be used on all cars.

Attractively displayed—50 on a card—

—Will sell themselves by simply placing the card on your counter.

The most profitable license plate holder for the dealer — the most satisfactory holder for the owner.

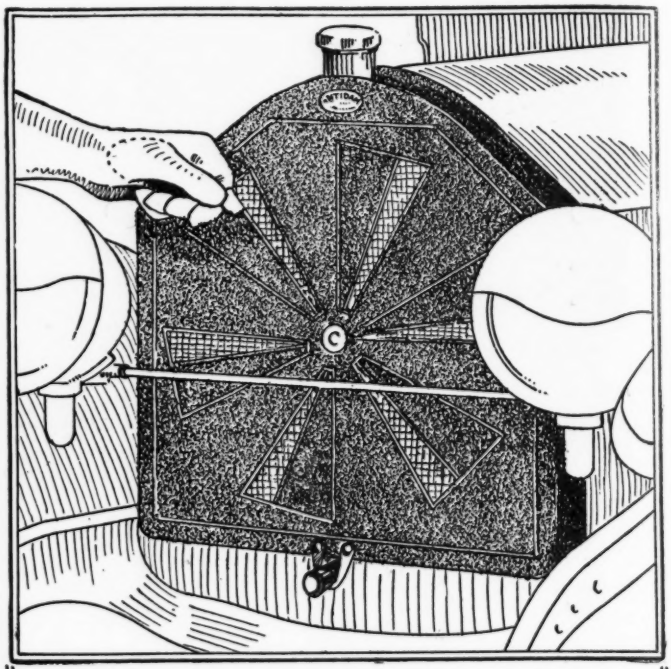


Exact Size of Lambert Holder

Retail price $1.00 for set of four

Send for dealer's proposition and a trial set today—then stock up and be prepared for the first of the year's business.

Lambert Manufacturing Co.
Highland Bldg.
Pittsburgh Penna.



Adjustable to Any Weather Condition

Antidam protects your radiator like a heavy winter overcoat. Keeps out the cold—retains the heat of the engine. Adjust it to suit the weather. Vents open and close easily on slightest pressure of finger tips. Antidam is the most sensible cold weather insurance you can put on your car. There's a size to fit every make and model.

Keeps Engine Warm

ANTIDAM
TRADE MARK
PAT. SEPT. 12, 1916
No. 1197817

Makes Starting Easy

Heat Retaining Radiator Cover

Antidam is a heavily padded jacket which gives your car a dignified, dressy appearance. The pads prevent freezing of water—keep it warm enough, in fact, to insure quick and positive engine operation even in the coldest weather, saving gasoline, battery, engine troubles, time and temper. Saves its cost many times in a single season, yet it is built to last for many years. Prices—$6 to $8.

See your nearest dealer or write us for full particulars. Be sure you get Antidam, the one entirely satisfactory adjustable Heat Retaining Radiator Cover.

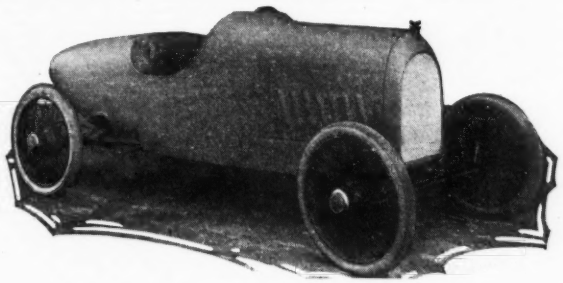
GLOVER EQUIPMENT CO.

412 No. Capitol Ave., Indianapolis, Ind., U. S. A.

Attractive Proposition for Dealers

Write for price list showing Antidam sizes for all makes and models of cars. Antidam is shipped you ready to install. With cold weather coming, there will be hundreds of Antidam sales right in your vicinity. Be prepared.

SPEEDWAY RACING AND SPORT MODELS FOR FORDS
HERE IS A DESIGN THAT BEATS THEM ALL



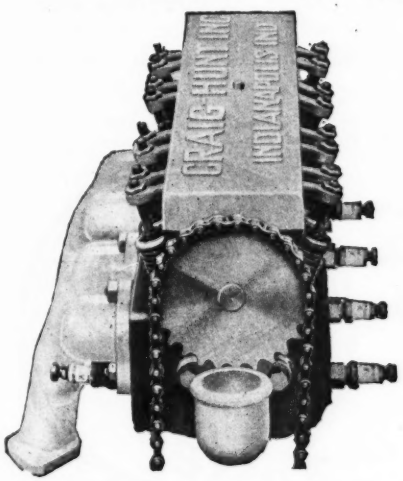
A Big Money Making Combination

Here is an extraordinary chance to do some real business with the "Speed Boys" in your territory. Sell them this snappy looking racer body and a Craig-Hunt 16-Valve Peugeot Type Racing Head. Could you imagine a more attractive and easy selling proposition?

And besides, the elegant appearance of Craig-Hunt bodies, the racing head will give a speed better than 70 miles an hour.

Get busy. Show this combination to the fellows who intend to build fast Fords this winter. You can't find better equipment and the profits are exceptionally attractive.

Craig-Hunt 16 Valve Racing Head For Fords



The CRAIG-HUNT 16 VALVE HEAD was designed for use on Racing, Speedsters and Sport Cars, where speed and power is the chief requirement. It embodies all the well known features of the Peugeot and the 16 Valve Stutz-Wisconsin Racing Motors familiar to all and makes them applicable to the Ford Motor.

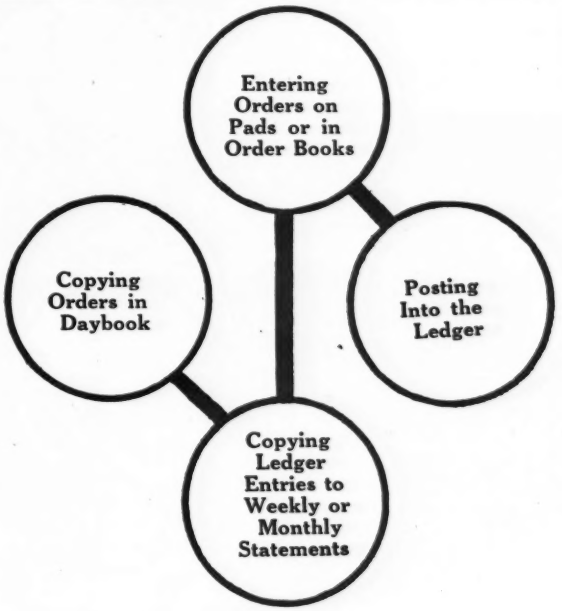
Send for Full Particulars

Craig-Hunt, Inc.

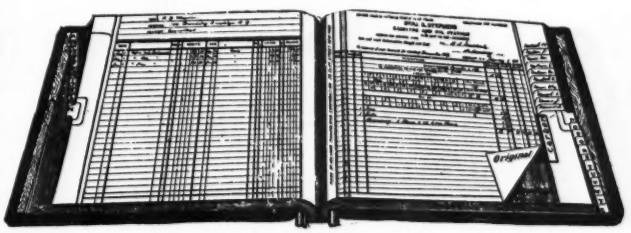
910 N. Illinois St., Indianapolis, Ind.

"AKKURATE"

GARAGE BOOKKEEPING SYSTEMS



REDUCE THESE FOUR OPERATIONS TO ONE



"AKKURATE"

SELF-INDEXING

Statement Ledger

A combination ledger and ever-ready statement, visibly indexed so that any account may be found and its exact condition noted instantly.

Only one entry for each sale does all this.

The Method. Entry of sale is made directly on the loose-leaf page, which is a regular statement. A duplicate sheet takes a carbon copy of the entries. At the end of the week or month statement is removed and sent to customer. Duplicate copy remains in ledger until statement is paid, when it is removed and filed.

The Result. Bookkeeping is reduced to the simplest form of detail work. Likelihood of error is reduced to a minimum. Complete record of every sale, including making out of statement, is made in one operation. Statements go out on time. Conditions of any account can be determined in a few seconds.

Individual Forms For Your Particular Business

The "AKKURATE" is a 100% perfect system and when applied to your business will result in better bookkeeping at a decidedly lower labor cost.

THE "AKKURATE" BOOKKEEPING SYSTEM

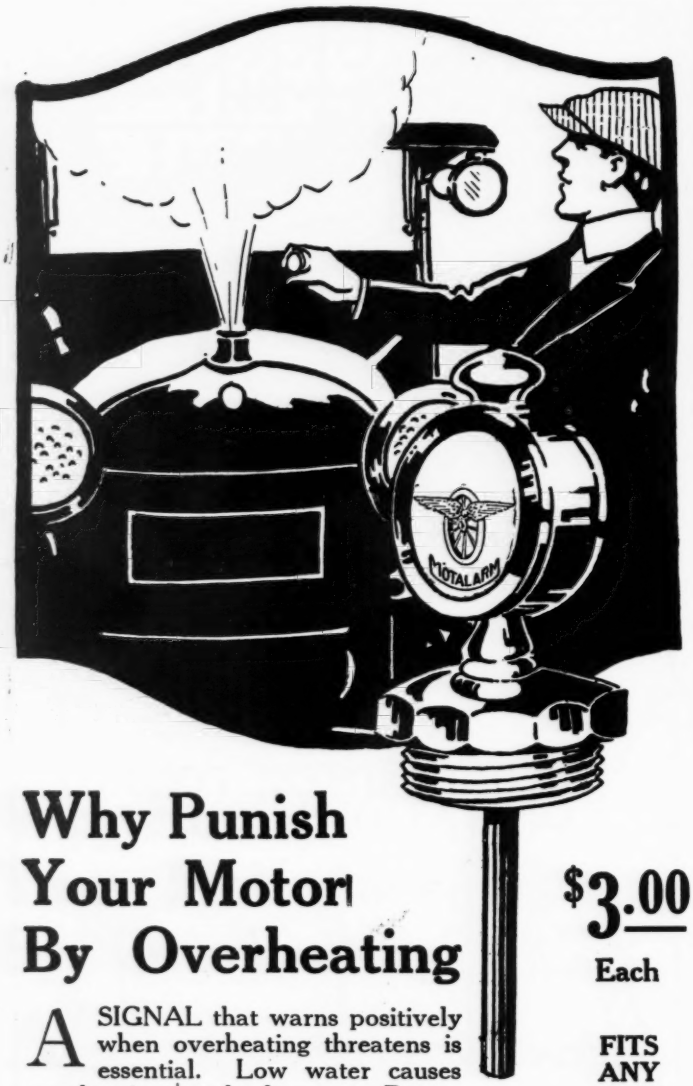
is an efficient, time-saving, error-preventing method of keeping all your accounts; record of purchases and sales; cash receipts and disbursements; purchase ledger; journal, general ledger, re-capitulation. The complete system in every way is as efficient as the "Statement Ledger" featured above.

EVERY GARAGE NEEDS IT

Vulcanizing Systems—Tire Tags—Repair Systems—Order Forms, Etc.

Accurate System & Manifolding Co., Inc.

12 ELM ST. NEW YORK CITY



Why Punish Your Motor By Overheating

$3.00 Each

FITS ANY CAR

A SIGNAL that warns positively when overheating threatens is essential. Low water causes overheating and danger. Put a Motalarm on your radiator cap and you will have complete protection from overheating. The Motalarm must whistle when the water gets low; needs no watching, costs nothing to operate and has no working parts to wear out.

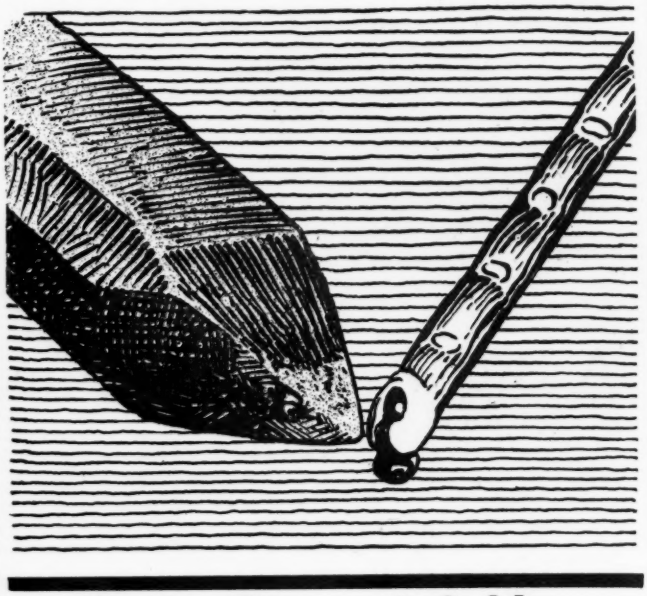
The Motalarm Corp.

1777 Broadway **New York City**

DISTRIBUTORS:

ROBERTSON-COLE CO., Singer Building, New York.
TIMES SQUARE AUTO SUPPLY CO., New York City.
TODD RUBBER COMPANY, New Haven, Conn.
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BUTTS & ORDWAY CO., Boston, Mass.
JOS. E. VIDAL, 27 Warren St., New York City.
G. R. ARMSTRONG MFGRS. SUPPLIES, INC., Boston, Mass.
GRAN & CO., Christiana, Norway.
G & O MFG. CO., Philadelphia, Pa.
SOUTHWESTERN SPECIALTY CO., Tulsa, Okla.
LORIN M. CAMPBELL, c/o Royal Bank, Sydney, Australia.

MOTALARM
The **WARNING WHISTLE**



Every Drop of Solder Carries Flux With It

You can solder that auto repair job without the bother of a separate soldering flux by using a wire solder with the flux right in it.

Kester Acid-Core Wire Solder

has a core made up of little cells full of flux. As you melt the solder off, the flux flows out in just the right quantity to automatically take care of the fluxing.

Handier and Easier to Use

It is handier because you haven't the bother of preparing or even carrying any separate flux. It is easier because the flux feeds with the solder. Anyone, repairman or auto owner, can now do a first-class job, and do it quickly.

It is sold in one pound coils in cartons and on one, five and ten pound spools

Ask your supply house for it or write us for free sample.

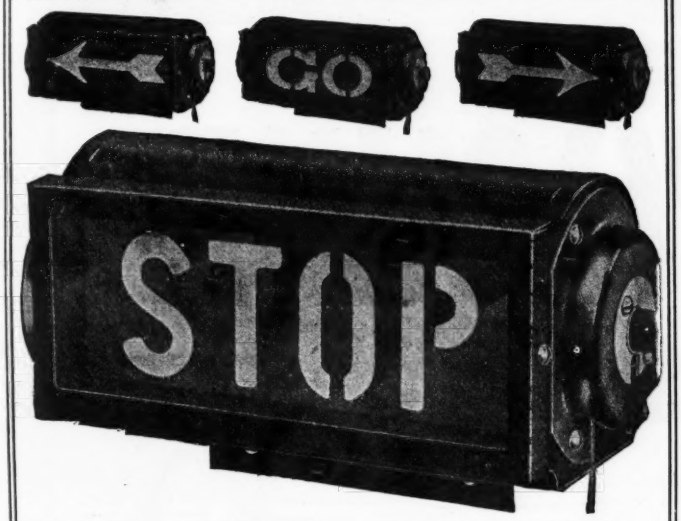
Chicago Solder Company

218 N. Union Av. Chicago

Pacific Coast Distributors

SIERRA ELEC. CO.
San Francisco, Cal.





"FOUR IN ONE"—"ALL IN ONE"

THE AUTO INDICATOR

makes "Safety First" more than a mere phrase. It

AUTOMATICALLY REDUCES

accidents and injuries.

It is not an experiment or a toy.
It saves money for the owners.
It makes money for the dealers.
It adds to the value of every car upon which it is installed.

COSTS BUT $15.00 COMPLETE

to the user, leaving a liberal margin of profit to jobber and dealer.

Jobbers and Dealers

Traffic conditions all over the country, and already laws in some states, demand a rear safety signal. The AUTO INDICATOR has met the most rigid tests and has demonstrated its worth. The AUTO INDICATOR pays a good profit to dealers and jobbers and makes friends for those who handle it. It is quickly and easily installed and something which motorists will buy and appreciate. The demand for the AUTO INDICATOR is unlimited and the price, while right to interest every car owner, is such as to offer attractive profits to jobbers and dealers. Write for particulars, prices and terms.

AUTO INDICATOR
GO
STOP
SAFETY SIGNAL
TRADE MARK

THE AUTO INDICATOR COMPANY

204-214 Ottawa Ave., N. E.

Grand Rapids, Michigan

EUREKA RADIATORS

KEEPS MOTORS FROM OVERHEATING



Radiates the Heat Away From the Water Channel

EUREKA Patented Fin Radiators are the latest invention in scientific radiation for motor cars.

Their patented fins serve a two-fold object, breaking the air up as it passes through the core and distributing it to all sides of the water channel, and **radiating the heat away from the water channel.** The zig-zag water channel permits of the greatest cooling efficiency.

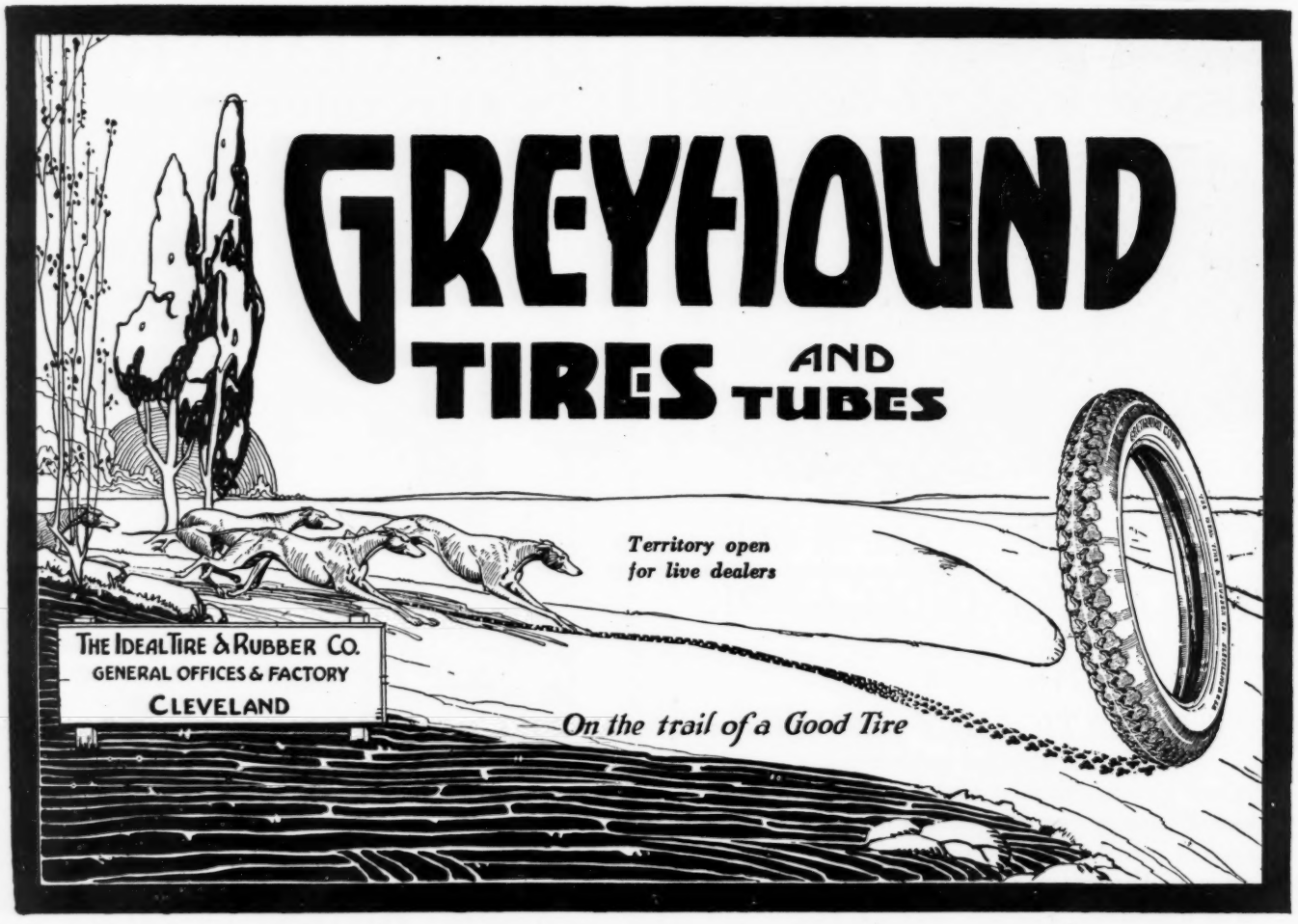
It is virtually impossible to overheat a motor when the EUREKA Radiator is used. Already adopted as standard by many leaders in the automotive industry.

Built of the best material money can buy and rigidly inspected by experts who know how.

Write for complete details and our guarantee of absolute satisfaction.

EUREKA AUTO PARTS MFG CO.

St. Louis, Mo.



NEW YORK
AUTOMOBILE REPLACEMENT
IGNITION COILS

New York Automobile Replacement IGNITION COILS

New York Automobile Replacement Ignition Coils have actually put hundreds of the smaller Garages and Service Stations in business—and are today the most treasured line of the largest Service Stations throughout the U. S. The explanation is simple. Most drivers have learned that the best car and engine fitted with the highest grade carburetor and workmanship cannot deliver its full power, smoothness or service unless the Ignition Coil delivers more than "just a spark."

Weak, partly broken down coils spoil owners' pleasure and temper, also your reputation, and the car's utility. A special New York Coil engineered to suit the exact requirements of each car manufactured—that will fire the poorest gas—that positively will not "miss" at highest engine speeds and rival magneto ignition is available.

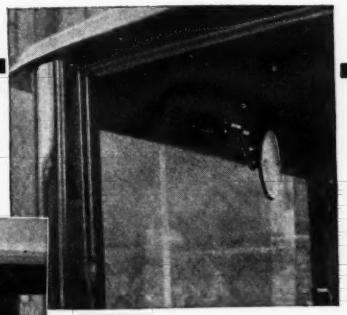
They are installed with no trouble in ten minutes, as they positively fit each car. Fifteen years of successful coil building experienced by an organization of Ignition Specialists, is the reason a car owner always agrees when told he needs a New York Coil.

More real profit, less come backs and easier made sales than any article you ever handled.

NEW YORK COIL COMPANY

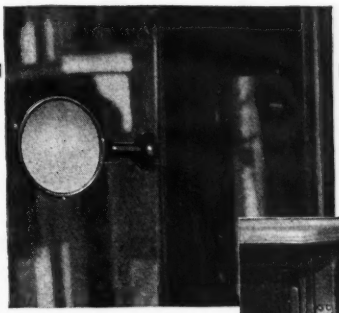
338-340 Pearl Street New York, N. Y.

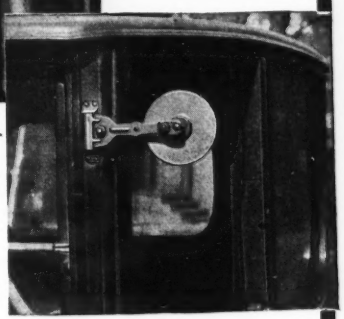
Style "B"





Style "C"





Hindview

AUTO MIRRORS

THE EYES IN THE BACK OF YOUR HEAD

THERE'S a ready-made demand for Hindview Auto Mirrors.

The legislators of Massachusetts, New York, Connecticut, New Jersey, California, and the province of Ontario say that every motorist must equip his car with a hindview mirror.

In other states similar bills are before the lawmakers.

You can meet this demand with an already popular line of auto mirrors—the Hindview Mirrors. Right now the sales of these mirrors are keeping dealers' stocks turning—netting handsome profits.

And no wonder—for Hindview Mirrors sell on their superior merits. Take the ball joint that allows easy adjustment in any position—the large 5 inch circular plain or lens plate-glass mirror—its weather-proof finish and rigid construction—they mean consumer satisfaction.

There's a good profit in selling this quality line that meets all needs—and our proposition is mighty attractive—write for it, also folder No. 19 describing all models.

KALES STAMPING CO. 462 West Lafayette Blvd., DETROIT, MICH.

PROTECTO

The Price Is **$15.00** A Set Complete



Makes the Ford the safest of all cars to drive.

Simple and performs a wonderful safety service.

Automatically controls *THE FORD* in case anything happens to the steering assembly.

Allows a Ford to be driven much faster over any roads with absolute safety.

PROTECTO

ENTIRELY NEW TO THE AUTO WORLD AND A NECESSITY FOR FORD CARS AND TRUCKS

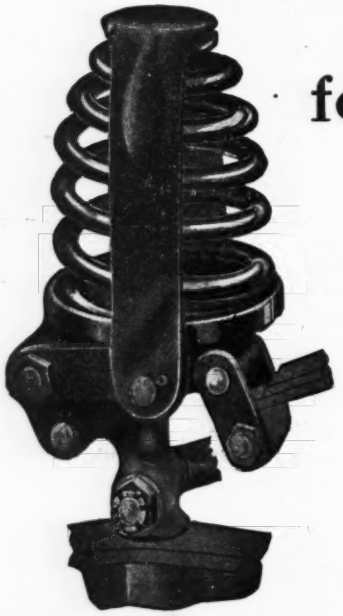
DEALERS, DISTRIBUTORS, AGENTS, WRITE OR WIRE.

ROBINSON MOTOR TRUCK CO.

908 HENNEPIN AVE. MINNEAPOLIS, MINN.

HALLADAY

Direct-Suspension Shock Absorber



Every Road is a Good Road for the Halladay Equipped Ford Car

It is when you are travelling the broken-up or muddy roads that you realize the perfect comfort of the Halladay equipped Ford Car.

For the tremendous capacity of the "bee hive" springs, takes up all the jolts and jars of heavy going and absorbs the little road vibrations.

Saves real money in tires, gas and wear and tear. It accomplishes more in every way. There are many details that will be mighty interesting to the car owner, the dealer and the jobber. Write for full particulars.

Price per Set.....$15.00

L. P. HALLADAY COMPANY

Manufacturers of Bumpers, Shock Absorbers and Automobile Accessories

520-530 Monroe St. **Streator, Illinois**

Guaranteed 10,000 Miles



At last—a fan belt of known and guaranteed performance. DEALERS—This is the safe belt to stock.

FLEX-O-TYTE FAN BELT

Combines Flexibility With Tightness.

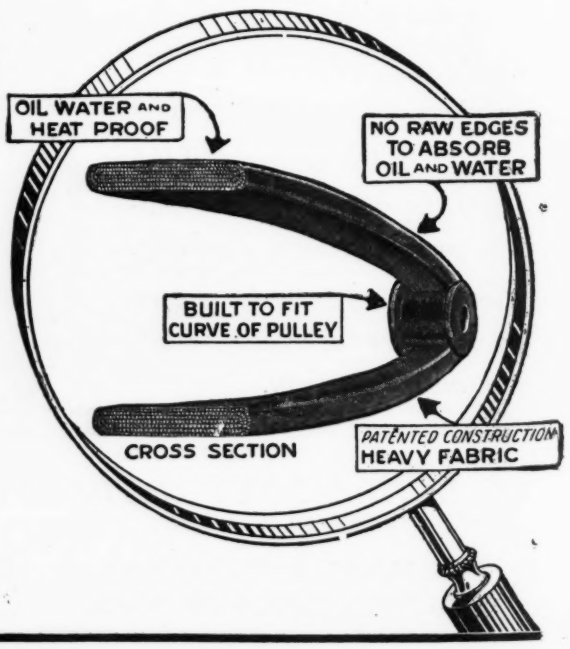
Made for all cars. Built of special Rubber Coated Fabric, vulcanized into a one-piece belt—wrapped cure process.

Dealers—Order Sample

The name of your supply house and 10c to cover postage and packing brings sample belt promptly. Our 32 page catalog FREE on request.

A. J. STEPHENS RUBBER CO.

1401 CHESTNUT STS. KANSAS CITY, MO.



A Layer of Knit Steel Wire Gives Added Efficiency to

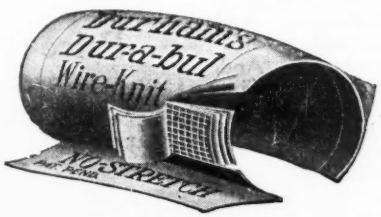
DURHAM'S DUR-A-BUL BLOW-OUT PATCH

This patch has an exclusive feature—something found in no other blow-out patch and dealers find this feature a big sales point. This **exclusive** feature is the layer of knit steel wire which gives the patch greater strength and adds to its life and efficiency. The cushion filler permits ample flexibility and at the same time makes separation of fabric impossible. In every respect this blow-out patch is a high grade, quality product that has a national sale and is giving complete satisfaction.

Bigger Business and More Profits for Dealers

Every dealer knows the big demand for blow-out patches. **You** can make mighty nice profits with a patch having a feature like Durham's DUR-A-BUL. And when you sell this patch you are selling a patch that will bring you more business than any other one you could stock.

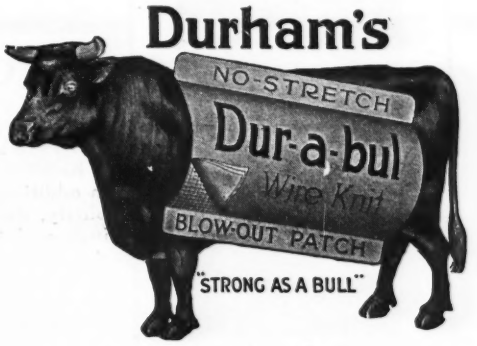
Send for Free Sample Patch



Upon request, we will send free to any established jobber or dealer one full sized patch which can be used for test purposes. We want you to be the judge, for we know this test will prove the DUR-A-BUL patch is more efficient.

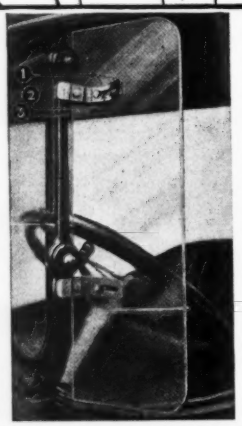
Write for your sample and our proposition

DURHAM MFG. CO.
1518 Grand Ave. Kansas City, Mo.









1. Deflector. 2. Durability, flexibility by rubber cushions. 3. Adjusting slot for ventilation.

Get in Step With a Live Proposition

Here's something for every car owner—something he'll want. The more particular he is the more he appreciates KRIMSKY Wind Deflectors. And that's the kind of fellow you like to do business with—it's profitable.

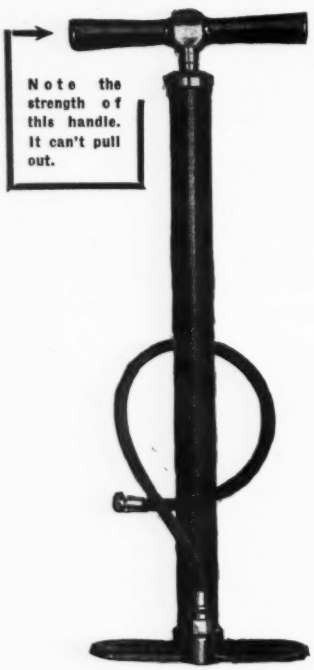
KRIMSKY Wind Deflectors assure comfort in any kind of weather. And, in addition, give a note of distinction to any car, regardless of price. Simplicity, durability and flexibility help to make sales easier. Rubber bushings and thick rubber cushions protect the glass from the most severe shocks.

Your opportunity is indicated by the business present dealers are doing on this accessory. **Get in step—write for complete details.**

EMIL J. KRIMSKY, 1305 Michigan Ave., Chicago, U. S. A.

Price $15.00 Per Pair

Boost Your Sales With The JAMES TIRE PUMP



Speeding up side line business is one of the activities of the James Tire Pump. Just display a few of these pumps in your show window or on the counter and see how sales grow. Your customers can see for themselves the value in this pump and its possibilities for service. The demand for the James Pump is growing steadily.

The James is strong and sturdy. It is a single action pump, acknowledged to be more efficient than compound types. There is no nightmare to tire pumping, nor aching back afterward, with the James on the job.

The James, in construction, is very simple. The handle will not pull off, because it is built to the piston rod, not just "stuck on." Connections do not leak because they are protected from strain. The big feature, the patented positive check valve, is so simple any owner can understand and take care of it.

Attractiveness in appearance is a James appeal to buyers. It is made of heavy durable material throughout and finished in bright black enamel and brass fittings highly polished.

Sales bring you good profits. Write us for literature and discounts.

GENERATOR VALVE CO., Sole Mfrs., 47 53 Dinsmore Place, Brooklyn, N. Y.

Finished in either screw or thumblock tire connections.

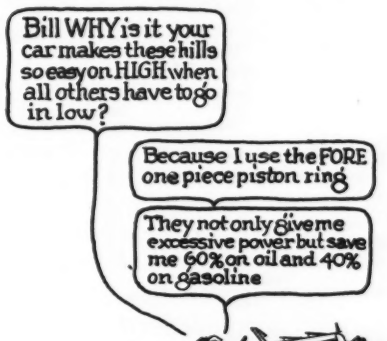
Profits! Profits!! Profits!!!

At last piston ring troubles are over for every car owner, and the opportunity of a lifetime is now presented to wide-awake dealers to cash in on the enormous sales that are bound to come. Get in on the ground floor! Get an edge on the other fellow!! Sell the Fore One Piece Piston Ring—sell it now! The Fore Piston Ring is a perfect gas tight, oil tight, and compression tight Ring and remains so throughout the entire life of the Ring.
It has features that no other ring can claim. The patented joint alone will convince any car owner and make the sale for you. Get busy now! Get complete details! Wire or write—but don't wait! Do it today!!

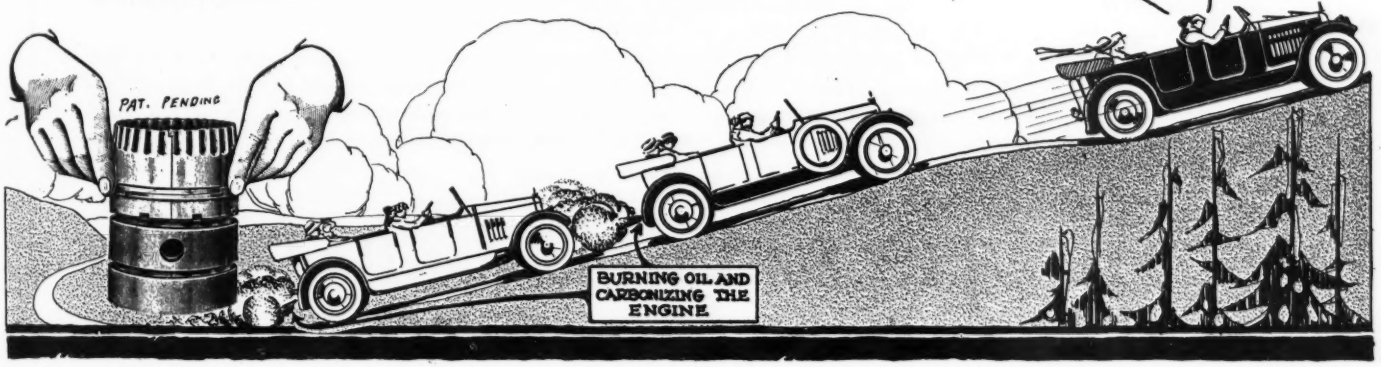


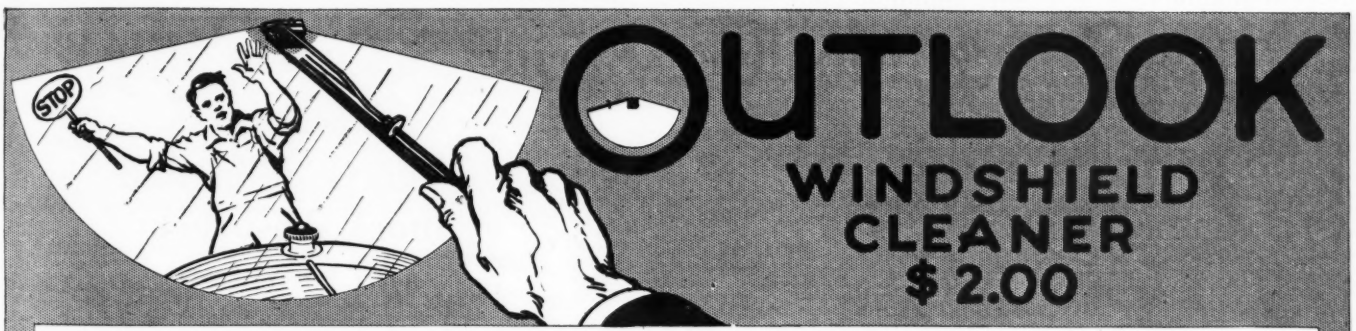
Fore Piston Ring Slip On

A device for putting piston rings on pistons without breaking. Can be used for a one piece, two piece or a three piece and good for all makes of piston rings.
The time saved in putting on one set of rings pays for it, and there is no danger of breakage.
Put up in sets of 14 different sizes, ranging from 2⅞ inch to 4½ inch.
Price per set.....$3.50
Or, each ..... .25



Fore Electrical Mfg. Co., Inc.
5811 Easton Ave., St. Louis, Mo.





Sell the Best Known Cleaner!

Outlook is not only the best cleaner but the best-known cleaner. It has been in use so long as to have a thoroughly established trade among satisfied users. Now extensive advertising is making it still better known. Dealers are concentrating their efforts on Outlook because it fills a real need, because it has a demand established and because a satisfactory profit can be made by pushing it.

Get in touch with your jobber TODAY for prices. This is an all season seller but there's no use missing business right now when sales are easiest of all!

THE OUTLOOK COMPANY
5529 Euclid Avenue, Cleveland

Ought to be Legal Requirement

Many dealers say "The law should compel the use of windshield cleaners." It's coming some day! In the meantime certain far-sighted dealers will be *skimming the cream off the trade.* Why not be one of them? Now is the time to make your profits!

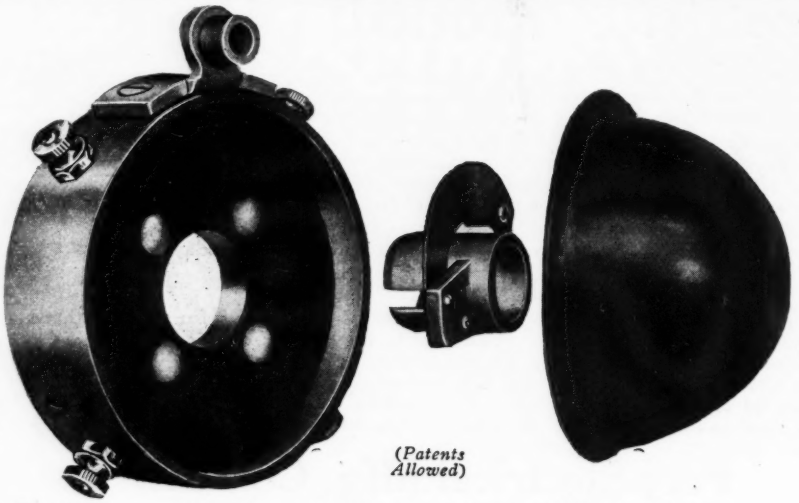
Feature the Outlook

Put the Outlook Cleaner in stock. Call it to your customers' attention. Feature it in the window every stormy day. Put the same effort behind it that you would put behind *any* active line, and you'll find it turning your capital at a mighty pleasing rate! *Have you an Outlook on your own car?*

"Randall" Double Service Timer for Ford Cars

100% electrical efficiency under all operating conditions. Easier starting at all times.

The "RANDALL" Timer with its patented, double surface feature, will produce more power, quicker exhilaration, quieter running, with much longer life than heretofore experienced with other Timers for FORD Cars.



(*Patents Allowed*)

The double surface of the "RANDALL" Timer is made of the highest quality fibre, with bronze contacts, insuring uniform wear, which has been demonstrated in many thousand miles of actual use.

One of the patented features is that when the Timer is completely worn out on one surface, it may be reversed, and doubles the life of the Timer,

It is the only Timer with a detachable Dust Cap, which permits of easy cleaning and examination, without removing Timer from motor.

The contact is maintained against the face of the Timer by a glass hardened steel brush, tension being maintained by a bronze spring, giving a constant flexible smooth wiping contact at all speeds.

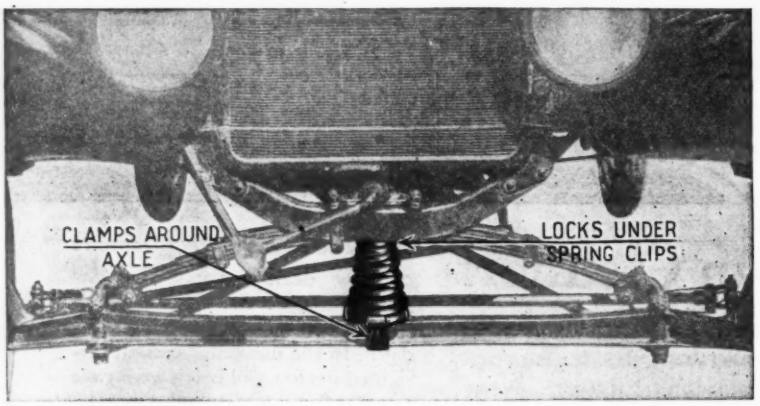
Sold on an absolute one-year guarantee

Jobbers, Dealers, Write for Prices and Discounts

SCHULTIS SALES COMPANY

16-24 West 61st Street **New York City**

The ARG Auxiliary Spring Sells Readily



Dealers:

The A. R. G. Auxiliary Spring is knocking on your door with profits for you. It sells on sight—can be installed in a few minutes—and the profits are liberal. Write at once for our proposition if your jobber does not carry the A. R. G. Springs in stock.

because It is a Combination Shock Absorber and Snubber

Everyone likes to kill two birds with one stone, but the A.R.G. Auxiliary Spring is an opportunity for you to kill three birds, Mr. Dealer. The A.R.G. is a shock absorber and snubber—and it will be a money maker for you. It is a device that you can recommend—a device which will interest every owner of a Ford touring car, roadster or truck.

Dealers know that front springs on Ford cars break when they repeatedly rebound beyond their normal arch. The A.R.G. Auxiliary Spring reduces the rebound and prevents serious mishaps to the front end—such as wearing out spring hangers, breaking tie bolt, fender irons, cutting tires, steering arm locking on radius rod, and radiator leaks caused by heavy jars.

The A.R.G. agency in your town means big money to you. Do you want it?

ARG Auxiliary Spring Co., Inc., Birmingham, Ala.

BULL-DOG MANIFOLD and TRANSMISSION LINERS

GOOD SELLERS—THAT STAY SOLD

TRANSMISSION BULL DOG LINERS

DEALERS

are making big money all over the country selling Bull-Dog Transmission Liner and Manifolds. Write today for our Dealers proposition.

JOBBERS

whose trade covers large territory are invited to get jobbers distributing proposition. Full particulars on application.



BULL-DOG MANIFOLD

is a combination intake and exhaust manifold. Superheats the intake manifold and produces a high-test dry gas before it enters the motor. Fifty per cent more mileage guaranteed. More power. Burns low grade gasoline or kerosene. Anyone can attach in 30 minutes with a wrench. No holes, no cutting, use same carburetor.



BULL-DOG LINERS

Are made of wood, chemically treated. Grip like a bull-dog. Vacuum cups hold oil and prevent burning out or heating. Guaranteed to outwear three sets of ordinary liners.

REARDON MFG. CO.

Manufacturers of Automobile Accessories
Peoria Illinois





Ford and Fordson Dealers

—any garage or repair man, any Ford or Fordson dealer, will increase his profits and win more satisfied customers the day he installs the

Universal Main Bearing Replacement Equipment

Ask your nearest jobber what he thinks of this equipment.

Write us for the name of a man near you who owns the equipment. And remember, that the Universal Equipment is the only equipment on the market that insures absolutely the same original alignment and the same identical accuracy of the bearing as the manufacturer achieved when he built the motor.

See current issue Automobile Trade Directory and Chilton's Directory for list of jobbers carrying stock. Write for catalog.



The Universal Tool Company

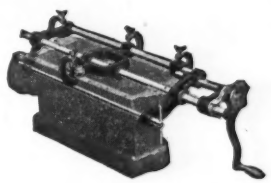
Manufacturers of Universal Cylinder Reboring Tools and Main Bearing Replacement Equipment for Fords and Fordsons

435 Woodward Ave., Detroit, Mich.

INCORPORATED

TRADE MARK UTCO REGISTER PENDING

UTCO PRODUCTS

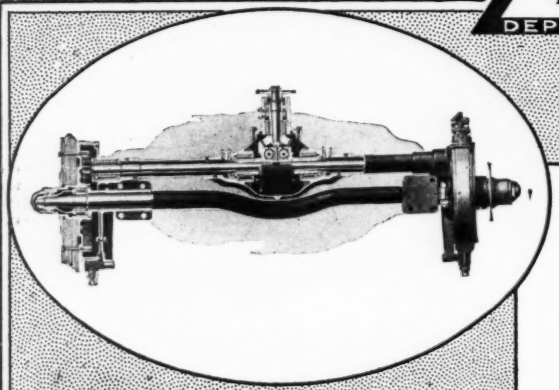


TRI-ANGLE

POWER SERVICE MOTOR TRUCK DEPENDABILITY

A Three-Fold Value

¾ · 1½ · 2 Special & 2½ Ton Models



LESS UNSPRUNG WEIGHT

Engineers agree that unsprung weight is at least six times as destructive to tires as weight above the springs.

The internal gear driven axles used in TRIANGLE Trucks are much lighter than any other type of shaft driven rear axle of equal strength. The saving in the 2½-ton TRIANGLE rear axle is 400 lbs. This means a saving equal to **2400 lbs. load weight.** Stop for a moment, and figure the saving in tires.

Your territory may still be open

Eastern Representatives
TRIANGLE MOTOR SALES CO.
381 Fourth Ave. New York City

New England Distributors
Eugene F. Lally and Sons Co.
Boston, Mass.

TRIANGLE MOTOR TRUCK COMPANY
St. Johns, Michigan

Make Big Money ©
Have a Business of Your Own
LEARN THE TIRE REPAIR BUSINESS



The opportunities in this field are wonderful. Over seven million autos in use means from thirty to fifty million tires which are constantly needing repairs,—and the number increasing daily.

Big Demand for Trained Men

Everywhere there is a big demand for men who are competently trained to properly repair tires. Every city and town in the country needs men who can do this work. The Big Tire Factories are constantly needing men who are properly trained in the tire business. Opportunities are opening up every day. You can establish yourself in the tire repair business or qualify for one of the many good paying positions open to trained, competent men.

Earn $25 to $100 Weekly

The opportunities are unlimited. Our graduates are fully qualified to handle the most difficult jobs possible. Their training enables them to fill good paying positions. They are qualified to handle every kind of tire-repair job. Our Course teaches the latest and best methods of tire reconstruction. You are taught to do the class of work for which car owners are willing to pay the best prices. Our graduates are easily able to earn from $25.00 to $100.00 weekly,—many do even better.

Our Course Complete and Practical

It covers every phase of the tire business. Students are fully instructed in the growth, production and handling of raw rubber and how it is made into tires. Every type and kind of tire is carefully studied and you are shown how each kind is best repaired. Every process is made plain and simple. You are thoroughly familiarized with the best repair shop methods known. Every possible feature is covered to insure your best success in the work.

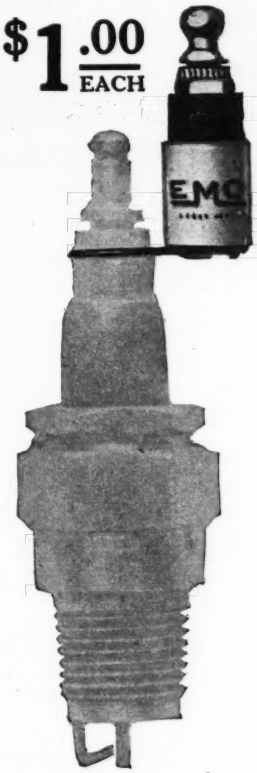
Our Graduates in Demand The thoroughness of our methods are widely recognized. We are continually asked for graduates who can fill responsible positions; take charge of repair shops or open up places of their own when there is need for trained services.

Write Today. Get Free Book Gives complete information on our Course. Shows how students are taught —the thoroughness of our methods—the wonderful results possible. Don't delay. Get started in this money-making business NOW!

Money-Back Guarantee
We guarantee to thoroughly teach our students the Tire Repair Business and fully qualify them to go into business for themselves or hold positions paying from $25.00 to $100.00 weekly or refund the tuition money. The demand for trained graduates constantly exceeds the supply.

MICHIGAN STATE AUTO SCHOOL
"Most Progressive Auto School in America"—"In the Heart of the Auto Industry"
72 Tire Building
687-89-81 Woodward Ave.
Detroit, Mich., U.S.A.

$1.00 EACH



EMO TRANSFORMERS

Increase Power Give Added Fuel Mileage

for AUTOMOBILES — AIRPLANES — MOTOR TRUCKS TRACTORS—MOTORCYCLES—STATIONARY ENGINES

The high-tension blue-white flash which is unfailingly delivered to the spark plug points through the EMO vacuum chamber, insures easy starting, quicker acceleration and a STURDY, UNIFORM flow of power at all speeds, with greatly added fuel-mileage. Prevents "bucking" or "loping." Protects entire ignition system. Keeps plug points free from carbon. Fits all plugs. One EMO on each plug makes all cylinders pull even. Guaranteed.

Dealers—Suggest EMO Transformers to your customers, and the sales will be quick and easy. There is a big demand that you should be supplying. **Write for our dealer proposition.**

Sent Prepaid on Receipt of Price

Export Agents:
CENTRAL STATES EXPORT CO.
403-404 Traction Building
Indianapolis, Ind.

Manufactured by
THE EMO LABORATORIES
2255 North Illinois Street
Indianapolis, Indiana

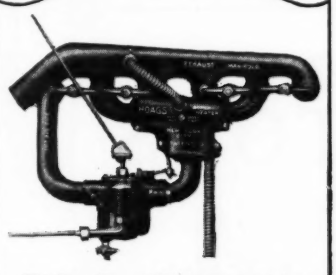
Canadian Distributors
FRANCO-AMERICAN EQUIPMENT CO.
402 Power Building
Montreal, Canada

The Hoag Manifold Superheater

Price $7.00

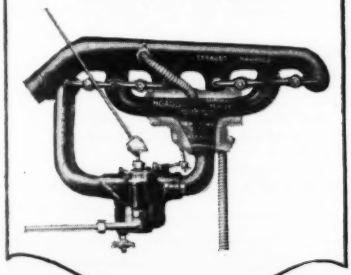
Ford Dealers—Heat Up Those Manifold Intakes and You Guarantee Ford Owners More Power, More Mileage and Less Carbon on Every Gallon of Fuel—and Faultless Winter Operation.

Price $7.00



Showing the airtight Super-heater bolted around the intake manifold. Hot gas from exhaust heats manifold to point where fuel is completely vaporized.

Showing phantom of Super-heater and exhaust pipe in place. When bolted on, asbestos packing retains all hot gas and keeps heat in manifold for hours after engine stops.



This method of increasing Ford economy and efficiency is the acme of simplicity and effective design.

Briefly, it is just a hot exhaust gas chamber bolted around the intake manifold. This waste gas must vaporize the fuel and so give the Ford owner a maximum of service that means money saved and convenience conserved.

The illustrations show the ease of installation and the sound principle back of the design. Only one hole to bore—no replacement parts necessary.

The Hoag Manifold Superheater is a Positive Necessity in Winter Driving. It puts "Pep" into Starting and Insures 100 per cent Efficiency from every ounce of fuel.

Dealers who investigate this heater and use it on a demonstrating car will find a selling field limited practically by the number of Ford car owners in their respective territories. We stand back of you with this GUARANTEE: "If after thirty days' trial your customer is not satisfied with it we will refund the money." Here is a practical, helpful device with accruing sales and big profits. **Get your territory now. Special inducement to jobbers and dealers.**

THE HOAG SUPERHEATER COMPANY, INC.
21 Park Row, New York City

From a Mass of Evidence

Baltimore, Md.,
Feb. 18, 1918.

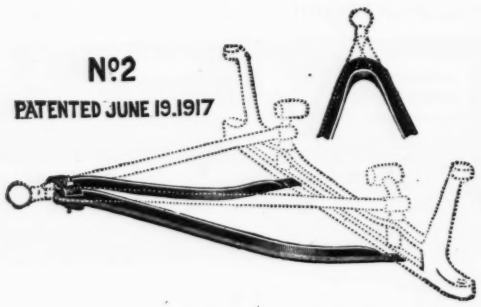
Hoag Superheater Corp.,
Watertown, New York.

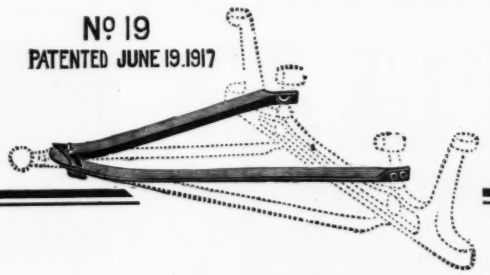
Dear Sirs:

I beg to advise I had a Hoag Superheater installed on my Ford car at Baltimore, Md., and drove my car from Baltimore to Philadelphia and return to Baltimore, a distance of 279 miles on an average of 36 miles to the gallon of gasoline, and I certainly am pleased to recommend the Hoag Superheater to any Ford owner, as I find my car runs much smoother and at a great saving of gasoline, and frankly and honestly say it was the best investment I ever made for the money and you could not buy it back at ten times its cost.

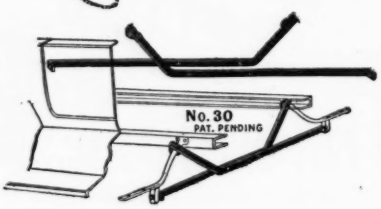
You may use this letter in any way you may see fit.

Very truly yours,
W. E. LEININGER,
4513 N. Camac St.,
Philadelphia, Pa.





BROCKSMITH Nos. 2 and 19 Radius Rod supports stand in a class by themselves. They fit directly into the crotch of the radius rods and therefore support the rod securely despite the possible loss of bolts and nuts.



The BROCKSMITH 2 in 1 Running Board Support consists of a brace for the front and one for the rear. The detail at the top of illustration is to show how each support is constructed.

More Safety for Motorists—More Profits for Dealers and Jobbers

The added safety BROCKSMITH Radius Rod Supports insure for Motorists, brings dealers a greatly increased volume of sales, without come-backs, and with consequently increased profit. Why not cash in today on the splendid opportunity BROCKSMITH Radius Rod Supports offer progressive dealers? Ask your jobber. If he cannot serve you, write direct.
Jobbers: Get them in your new catalogs and supplements. You'll find a ready demand worth while.
You are all invited to view our display at the Hotel LaSalle the week of November 3 to 8, in connection with the Automotive Equipment Jobbers' Convention. See for yourself the opportunity for sales.

Brocksmith Manufacturing Co., Inc. St. Louis, Missouri



Complete with Rings and Pin

Increase Your Mileage 25% for $2.50

Cochran
FORD PISTONS

SAVES REBORING
A size for every CYLINDER

Furnished in Standard Size
Also the following Oversize

.0025 .005 .010 .015 .020 .025 .03125 .045

Light Weight Step-Cut Rings, Oil Groove

DETROIT METAL PRODUCTS CO.

DETROIT, MICHIGAN

TRIAL ORDER

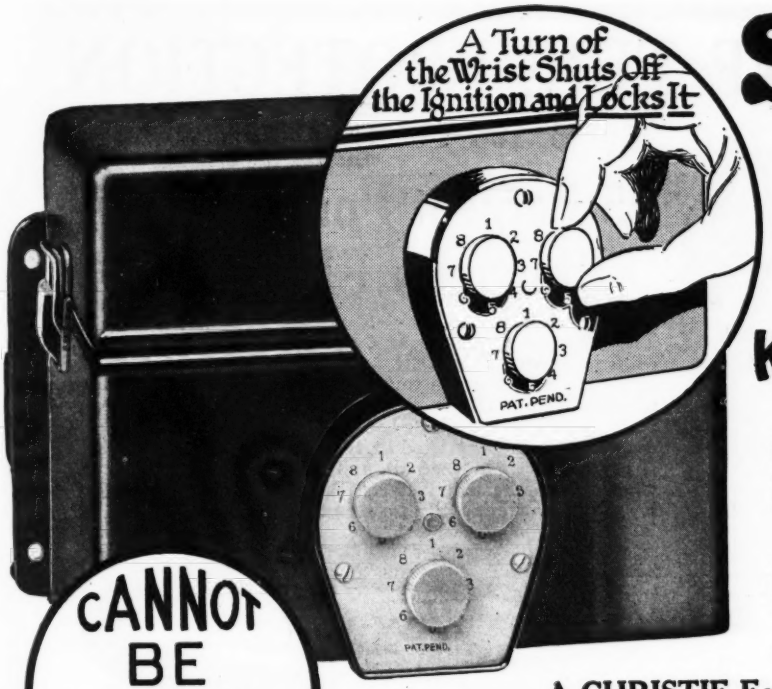
Garages and Repair Shops
DETROIT METAL PRODUCTS CO.,
Detroit, Mich.

Please ship by Parcel Post prepaid,
1 complete set of COCHRAN PISTONS

Size..... Price $7.20

Name .....

Address .....



Price $6.00

Simple—Safe!

CHRISTIE COMBINATION

Keyless Lock for Fords

Simple in design and construction—simple in operation—safe from the most skillful thief—that describes the CHRISTIE Combination Keyless Lock for Fords.

Thousands of combinations are possible and only the right one will unlock the ignition. This lock baffles the professional auto thief.

Underwriters' Laboratories Inspected—Reduces Insurance 15 per cent.

A CHRISTIE Equipped Ford Cannot Be Stolen

The CHRISTIE cannot be wired around—it foils the most experienced thief.

The lock is securely bolted to the coil box. The heads of the bolts are covered by the top of the lock and cannot be removed.

Dealers—You can make money by selling a really safe lock. There is a big demand for the right kind of Lock for Fords. Send a draft for first sample lock and details of our proposition.

CHRISTIE AUTO LOCK CO.
6607 Dorchester Ave., Chicago, Ill.

Announcing The New National Jack

which is

A Cracker-Jack

With the new NATIONAL JACK, one can change tires with ease of operation and in much less time than with any other Jack.

SPECIAL FEATURES

Made of malleable iron casting with worm gear drive. Has an adjustable base, which gives three ranges of height to the Jack before raising the screw. These adjustments are made quickly by simply turning a small malleable iron thumb screw.

Has quick release which enables one to lower the screw without turning it down after taking the Jack from under the car. The long folding handle permits one to place the Jack under the car and to operate same from a standing position.

If your dealer is unable to supply same, we will ship prepaid anywhere in the United States of America, upon receipt of $7.50. Satisfaction guaranteed.

Write for circulars and information to the

National Machine Company, Inc.

BRATTLEBORO, VERMONT

HERE IS GENUINE TIRE PROTECTION



Pat. Applied For.

Try to strike a nail through two shingles held in the fingers. It will pierce the first shingle but push away the second. This is the easy-to-understand principle that explains how Jon-Con Protectors eliminate 95 percent punctures. Because of its thickness which acts as an inner support for the casing, the Jon-Con Protector distributes road shocks to a larger area thus preventing the majority of stone bruises and increasing tire mileage 50 to 100 percent. The first cost is the last cost because Jon-Cons can be used in one tire after another.

Send to the address below for full particulars of Jon-Con Protectors. Sales representatives will be given full information regarding territory now open.

50 to 100 Per Cent More Mileage

95 Percent Punctures and Blowouts Eliminated

The Jon-Con Protector is made of one continuous piece of firm elastic RUBBER and reinforced. It fits snugly between the outer casing and the inner tube; installed merely by pressing in with the fingers—no tools, no cement. When a nail or other sharp object pierces the outer casing, it is resisted by the Jon-Con Protector, which is pushed away by the nail, and the next revolution of the wheel bends the nail between the Protector and the Casing, thus protecting the tube from puncture.

JON-CON TIRE PROTECTOR

Made in one continuous piece—no joints to pinch inner tube.

JONES-CONOVER PRODUCTS CO.

2124 North Fifteenth Street (Dept. A) Philadelphia, Pa.

How much Time to Inflate A Giant Truck Tire





PNEUMATIC TRUCK TIRES are here to stay. Are you equipped to serve them? Have you capacity for the marvelously growing demand on air plants.

To put 130 to 150 pounds into a tire is no pygmy task. It requires a compressor specifically designed for this service and a tank pressure far in excess of this amount.

An ordinary compressor requires too much time for this service even if capable of handling it—and if overloaded to accomplish the end it is sure to depreciate prematurely.

The Giant Usaco De Luxe Compressor, here illustrated, is an evolution of the Standard Usaco De Luxe, of which thousands are in use. The Standard Usaco De Luxe is fundamentally a high pressure machine but this Giant Unit affords even greater service and satisfaction.

A larger motor with a compressor of greater capacity, a bigger tank provides greater storage capacity; a new air purifier assures getting the very purest air free from oil or moisture; a fan type flywheel amply cools the compressor. Then there are many other features of value.

Giant Usaco AIR COMPRESSORS TRADE MARK De Luxe

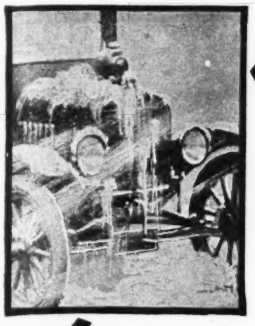
Two Stage Automatic Air Compressor

Write for circular giving all the facts about both machines.

The United States Air Compressor Co.

Carnegie Ave. CLEVELAND, OHIO

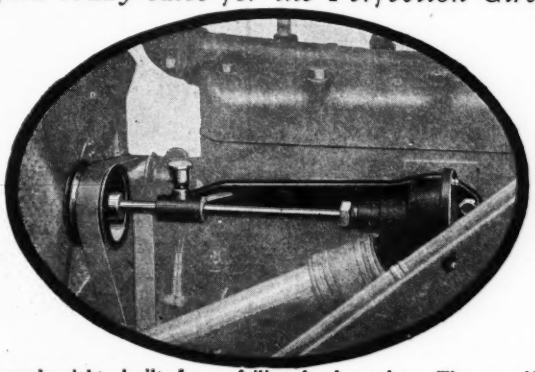
By Far the Best by Every Test



THE PERFECTION CIRCULATING PUMP
FOR FORD CARS
MEANS PAYING WINTER BUSINESS

When the thermometer begins to drop down around zero—the Thermo-Siphon Cooling System on the Ford is bound to fall down—*and that's when you will find ready sales for the Perfection Circulating Pump.*

There's no danger of frozen radiators or water jackets when a Ford is equipped with the Perfection Circulating Pump. It makes the Ford Cooling system as reliable and positive in action as that on the most expensive cars. Speeding up the circulation prevents boiling and stops evaporation of the alcohol or other costly anti-freeze compounds.



And when summer time comes round with its blistering heat the Perfection also pays its cost many times over for it prevents overheating; that means a sure saving in gas and oil to say nothing of the prevention of wear on the motor itself.

Easily installed, with no other tools except a small wrench—no drilling or other mechanical changes need be made.



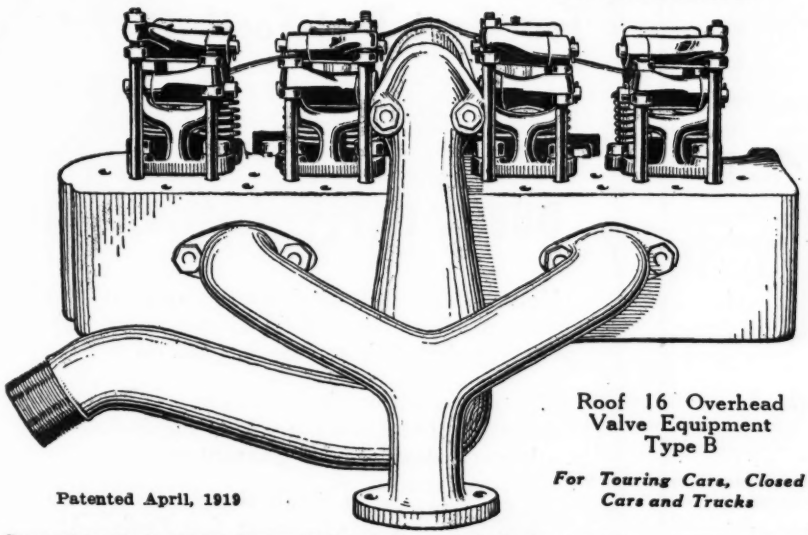
The Perfection Circulating Pump is made right—built for unfailing hard service. The centrifugal principle on which it is designed means sure and positive circulation. The body casting is made in one piece, assuring absolute alignment of the bearings at all times. The bearings themselves are of ample size to stand the wear and tear of continuous running. The entire pump is constructed of the best grades of material and is carefully and accurately machined. *We guarantee every Perfection Pump against defects in material or workmanship.*

DEALERS—JOBBERS *Sell the Circulating Pump that is giving perfect satisfaction.*

There are thousands of them in use today. Our trade discounts are liberal and you will find us ready to extend business building co-operation to acquaint your trade with the merits of the Perfection Circulating Pump.

FELKER BROS. MFG. CO. **Marshfield, Wis.**

POWER and SPEED
Roof 16 Overhead Valve Equipment
For Ford Motors



Roof 16 Overhead Valve Equipment Type B

For Touring Cars, Closed Cars and Trucks

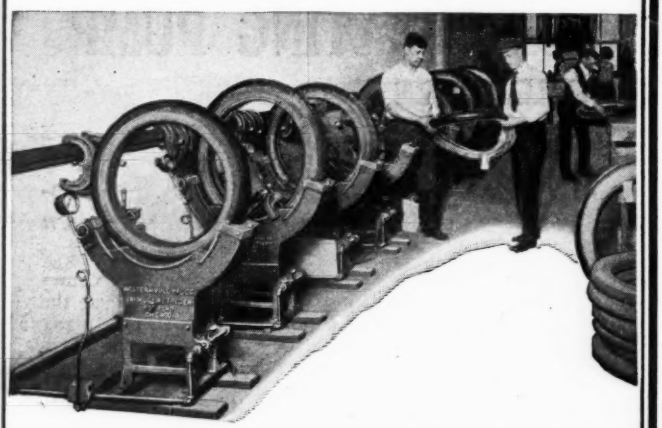
Patented April, 1919

The Most Remarkable Power Device, Even in This Inventive Age

Hill Climbing for touring cars—pulling power through sand and mud—doubles the hauling capacity of converted Ford truck-speed for mile and half-mile tracks to rival the fastest cars built. Ford racing cars with our Cylinder Head Equipment and special racing parts have attained speeds from 80 to 100 miles per hour. Price, complete, $115.00 f. o. b. factory, excise tax paid. Nothing extra to buy. Cylinder Head Equipment all ready for installation. It takes the place of the regular Ford Cylinder Head. Any mechanic can easily and quickly install it.

Comparison Brake Horse Power Tests at the United States Bureau of Standards gave Standard Ford motor with regulation carburetor 18.7 Horse Power. The same motor with 16 Valve Head and regulation carburetor 22.4 Horse Power. The same metor with 16 Valve Head and Special carburetor 29.7 Horse Power. Recent tests at U. S. Bureau of Standards gave 32 Horse Power. We are Manufacturers and Distributors of speed and other specialties for Ford cars; 3 to 1 gears, high speed camshafts, aluminite, light grey iron pistons, lynite pistons, aluminite connecting-rods, racing spark plugs, racing carburetors, roller bearings, counterbalances, wire wheels, multiple speed transmission, high tension magnetos, special oiling system, special worm and gear, steering gear, racing tires, racing bodies, hood and radiator, parts for underslinging chassis. Tell us what you want. We can supply it. Racing quality. Lowest prices. Send for our Complete Literature on how to build fast cars and double the value of your converted Ford Truck and descriptive circular on Speed and other Specialties for Fords.

LAUREL MOTORS CORPORATION **Anderson, Indiana, U. S. A.**



More and Better Vulcanizing Will be Demanded in the Coming Year

Motorists are beginning to appreciate what can be done with proper vulcanizing. They will demand more of it from now on, but to hold their business it will have to be done *right*.

Tire-repair shops should investigate without delay the equipment that has revolutionized the industry and placed it on a reliable and highly profitable basis.

THE DRI-KURE RETREDER

It is the only vulcanizing method on the market that is fundamentally *right* all the way through. The battery of Retreders at the top is shown rapidly turning out finished tires which will require no expensive working over—and which will be turned over to the owner guaranteed with the assurance that there will be no "comebacks" on account of deficient workmanship.

The non-heat conducting Wood-End Blocks (a special patented feature) absolutely prevents mold-marks and spongy places. The special matrix-inserts permit three different styles of treads to be turned out from the one machine.

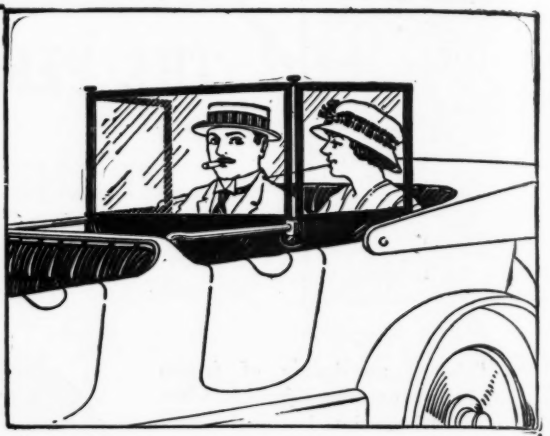
As is generally the way with every successful product, our name, trade mark and product are being widely imitated. For your protection as well as ours, we suggest writing for a catalog on the *real* Dri-Kure Retreder at once.

WESTERN VULCANIZER MFG. CO.

Manufacturers of Dri-Kure Retreders, Sectional Molds, Buffing Machines and Other Vulcanizing Equipment.

Dept. A. 150 N. Desplaines St. Chicago

There's No Better Winter Seller



Than the "J. H." Tonneau Shield

The First Cold Winds Will Start Your Sales

The "J. H." Tonneau Shield is an imperative need of Touring Car owners. With it the touring car is not only comfortable, it is also the most healthful model for winter driving.

With the top and sides up it makes the rear seats as tight as a limousine in stormy weather.

Water proof apron at bottom keeps robes dry.

The "J. H." Tonneau Shield is a proved success. It has been on the market for several years. Thousands are now in use.

The "J. H." Tonneau Shield is well made and handsomely finished—simple—durable and easily handled. When not in use it folds down behind driver's seat.

Guaranteed not to rattle, break or injure the car. Installation is simple.

Can be attached to any car.

The "J. H." Tonneau Shield embodies every practical advantage—it has no defects.

Dealers and jobbers write for prices, discounts, etc.

The Tonneau Shield Company, Inc.

1777 Broadway, New York Phone, Circle 5640



Toot-Toot-Toot-Toot!

You hear it everywhere—on the country roads andcity streets. It's the note of the

BUELL EXPLOSION WHISTLE

Here is the best and most efficient warning signal made — the original explosion whistle operating direct from the engine.

The engineering departments of 70 automobiles and trucks have passed on it—and accepted it. It carries a 10-year guarantee.



In Single Tone and Chime. Special equipment for Fords. At your dealer or write us direct.

Buell Manufacturing Co.

2977-79 Cottage Grove Avenue

CHICAGO

ALL IN

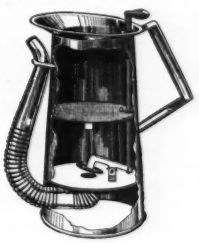
Takes the Place of Them All



HERE is a liquid measure that will eliminate your wasteful old funnel and the dripping, unhandy measure. The ALL-IN-ONE Measure is fitted with a flexible metal tube—you not only measure the oil, but also put it into the crank case without spilling a drop.

All you have to do is to insert the end of the flexible metal nozzle in the filler plug or other receptacle—press the thumb lever which releases the valve, and the oil flows just where you want it.

Write today for detailed information.



The ALL-IN-ONE is made in two styles:

Ivory Enameled . $3.50
Coppered . . . 3.50

Manufactured by BROOKINS MFG. CO.
Sales Department:
THE BAILEY-DRAKE COMPANY, *Inc.*
1120 S. Michigan Ave., Chicago, Ill.



A BETTER

BATTERY

AT A BETTER

PRICE

OUR NEW SERVICE PLAN GIVES YOU A DISCOUNT OF

50%—10%—5%

The M. & M. battery is not a new battery, **nor** is it an experiment, but a battery that has 14 years of manufacture behind it, a battery that has carried a **real guarantee** for the past ten years. This battery has never been sold to dealers or jobbers at a discount greater than 50% off, but through our new service plan, you have the opportunity of buying this battery at 50%—10%—5% from list.

A REAL GUARANTEE

If any M. & M. battery fails to develop at least 80% of its efficiency at the end of one year, said battery will be restored to at least 80% of its original capacity.

MOLTER SERVICE COMPANY
Association Bldg., Chicago, Ill.



It protects without damage to itself

YOU wouldn't ride down the street in a car with a crooked, bent-up bumper, nor do your customers want the ordinary bumper that goes this way when hit.

Sell them the Star Bumper. It not only protects the car but it absorbs the shocks without any damage to itself. It will not bend or twist out of shape.

Back of the front channel bar—about 3½ inches—is a straight bar, between these are five strong coil springs that cushion the shock—absorbing tremendous blows. From these double protection bars run steel arms that clamp securely to the frame.

Rubber inside the springs insures against any rattle.

The Star Bumper fits any car—and goes on either front or back. It is made of high carbon steel in nickel and black. Jobbers and Dealers write for our liberal sales proposition. Each sale nets a good profit. Write now for full particulars.

CLEVENGER ENGINEERING and SALES CO.
86 McKinley Place Ridgewood, N. J.

The Star Bumper

that absorbs the shock

Send Us Your
SCORED CYLINDERS

and cracked water jackets. Our factory nearest you will make these repairs on a 24-hour service basis.

Regrinding of cylinders that have been scored by wrist pins or through other causes is unnecessary. The Lawrence Patent Process fuses a silver-nickel alloy into the defects making a quick, clean, permanent job **without altering the bore of the cylinder.** Same piston and rings fit.

Cracked water jackets are also made permanently good through this same process.

A list of our factories is given below. There is one near you. Send the scored cylinders and cracked water jackets to the nearest plant. There we will insure you quick service and perfect results.
Aside from the liberal arrangements we make with you, the money saving service you render your customers will help make you known as a concern that looks after their interests—and this is a business asset in itself.

Write to any of our factories for full information

L. LAWRENCE & COMPANY
Woolworth Bldg. New York

PLANTS

Buffalo, 10 Summer St.
Chicago, 1522 Michigan Ave.
Cleveland, 6259 Euclid Ave.
Detroit, 1246 Jefferson Ave.
Los Angeles, 335 Washington St.
Milwaukee, 18-26 Martin St.
Minneapolis, 14-16 N. 9th St.
Newark, N. J., 292 Halsey St.
N. Y. C., 791-3 Eleventh Ave.
Philadelphia, 1601 Summer St.
Pittsburgh, 5102 Baum Bldg.
San Francisco, 116 Hyde St.

LICENSEES

Denver, Blanchett Welding Co., 149 South Broadway.
Kansas City, Kans., General Auto Parts Co., Grand Ave.
Lima, O., Buckeye Repair Shop, 133 Water St.
Memphis, J. B. Cook Machine Shop, 294 Washington St.
Providence, R. I., Liberty Manufacturing Co., 15 Pine St.

Established 1862

A Few Territories Still Open for Licensees

LAWRENCE PATENT PROCESS

SCORED CYLINDERS AND SAND-FAULTS CORRECTED — TRADE LAWRENCE MARK — BORE PRECISION MAINTAINED CYLINDER SCRAPPING ABOLISHED

"WHITNEY" KEYS

For the benefit of dealers and repair men we put up our keys in two assortments. Every garage man and repair man should keep these on hand. They may be purchased from the leading jobbers or ordered direct from the factory.

Regular Assortment



One hundred keys of the sizes most likely to be required for repair work on Motor Cars, Motor Trucks and Tractors.

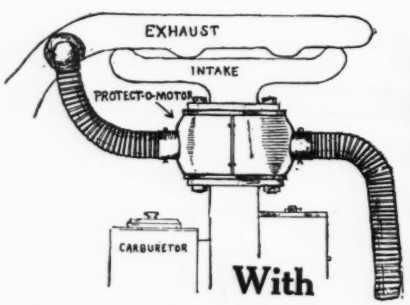
Ford Assortment



One set of keys for the Ford car. These keys are of the special material and special treatment specified by the Ford Motor Company.

The Whitney Mfg. Co.
HARTFORD, CONNECTICUT

CHAINS, KEYS AND CUTTERS, HAND MILLING MACHINES



Let's Boost Your Winter Profits With

Losee PROTECT-O-MOTOR
(Hot Spot)

Now comes cold weather—winter—the time when car owners know their carburetors can't vaporize the gasoline as quickly as in warmer weather. The Losee PROTECT-O-MOTOR (Hot Spot) will do away with this inefficiency in vaporizing the gasoline and result in a big fuel saving to the car owner. Does away with fuel condensation in the crank case.

PROTECT-O-MOTOR (Hot Spot) is easily fitted on between the carburetor flange and the intake manifold. It operates through salvaging the hot gases from the exhaust pipe.

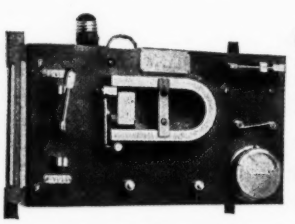
PROTECT-O-MOTOR (Hot Spot) has a Ready Made Market. Now is your chance to share in the big winter profit dividend. Write for full particulars and attractive proposition to dealers.

Made by

J. S. Losee Hebron, Ill.

YOU CAN CHARGE BATTERIES AT COST OF 5 TO 15 CENTS WITH FORE RECTIFIER TYPE 2-B

Battery Cannot Be Harmed by Leaving On Overcharge



Costs Nothing For Maintenance—Is Self Starting

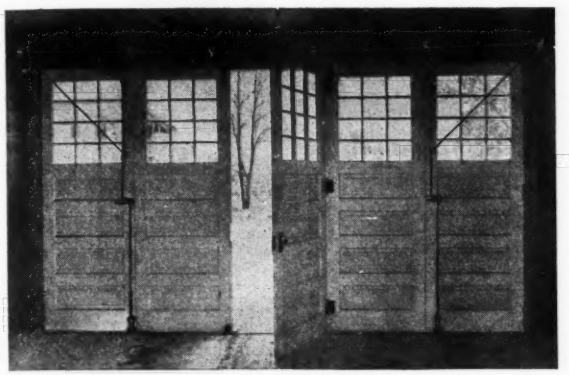
Fore Rectifier is the logical solution to your battery problems. With the Fore it is absolutely safe to put batteries on charge overnight. The current consumed by the Fore is very small. There is no maintenance expense or depreciation so that the cost per charge is simply for the current put in the battery.

The Fore Rectifier is self starting and upon resumption of line current, the charging is continued. The Fore Rectifier is your chance to save money in charging batteries. Write for details. It means money to you.

Kentucky Electrical Co.,
Owensboro, Ky.

Slidetite

THE LAST WORD IN GARAGE DOOR HARDWARE



Gives more of service to the garage user than any other style of garage hardware made. Acknowledged by Owners, Builders, Architects and Hardware merchants, to embody the greatest amount of convenience, economy and ornamental possibilities.

Simple to install, easy to operate, readily adjustable.

Doors can't sag. Stand where you open them without locks or holders. Close weather-tight. Add to the appearance of the building.

Write for descriptive folder FF-1

Richards-Wilcox Mfg. Co.

"A Hanger for any Door that Slides"

CHICAGO ST. LOUIS LOS ANGELES PHILADELPHIA — AURORA, ILLINOIS, U.S.A. — BOSTON NEW YORK MINNEAPOLIS SAN FRANCISCO — LONDON, ONT.

Dealers—

We are now in a position to offer to you the perfected Marshall Speed Wagon—the most salable commercial vehicle available. We have a complete line of truck models —1, 1½, and 2-ton capacities.

Write for complete details. There is already a tremendous demand. Our offer to dealers is most liberal.

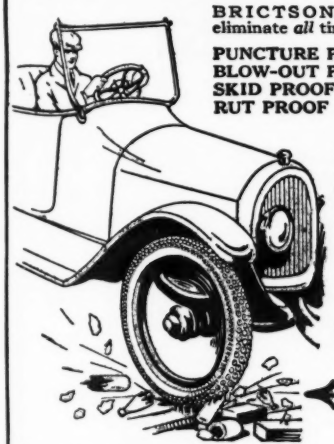
Our modesty prevents us from saying it—but any MARSHALL Dealer will tell you that MARSHALL passenger and commercial vehicles are the best selling propositions in the automobile field today.

MARSHALL MFG. CO. CHICAGO, ILLINOIS

20,000 Miles Without a Puncture

That is the remarkable report a man sends to us. He used the same air that was pumped into the tube when put on.

Written Guarantee for 10,000 Miles



BRICTSON PNEUMATIC 10,000-Mile Tires eliminate *all* tire troubles because they are—

PUNCTURE PROOF	RIM-CUT PROOF
BLOW-OUT PROOF	OIL PROOF
SKID PROOF	GASOLINE PROOF
RUT PROOF	TROUBLE PROOF

Run through glass, nails, tin cans, ruts, oil, over slippery streets—it makes no difference.

BRICTSON Tires are the outcome of ten years of rigid testing. They are proving a revelation in the tire world for the good reason that they solve *all* tire problems.

Enthusiastic Reports

One man says he has run 18 months without a puncture or other tire trouble. Another says he has forgotten what tire trouble is. One writes that he never takes his tires off only to paint his wheels. Still another says that he has no use for chains since using BRICTSON Tires, which do NOT skid.

Can You do this with Your Tires?

Try 'Em First—Then Pay! Has a tire manufacturer ever offered you as much? Neither could we if years of testing had not proven beyond all doubt that BRICTSON 10,000-Mile Tires are the complete perfection—the final word in tire construction. And we want YOU to try BRICTSON Pneumatic 10,000-Mile Tires *at our expense*. Your inevitable delight and enthusiasm over the results of this trial is our assurance of your satisfaction.

Don't bother about writing a letter. Just clip the coupon at left, fill it in and mail to us TODAY. It puts you under no obligation.

FREE TRIAL COUPON

BRICTSON MFG. CO.
Dept. 12-119, Omaha, Nebr.

Please send to me by return mail, the details of your FREE TRIAL OFFER and complete information about BRICTSON 10,000-Mile Tires.

Name

Street, P. O. Box or R.F.D.

Town State

I use ..... tires
Give Size

Brictson Manufacturing Co.

1015 to 24 Woodmen of the World Bldg.

Dept. 12-119 Omaha, Nebraska

WIRE WHEELS

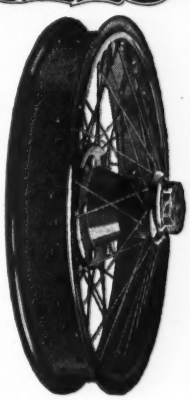
HOUK

QUICK CHANGE

We can supply immediately, sets of Houk Wire Wheels for all the cars listed and any of the service stations below will gladly install them.

Dealers should send at once for the particulars of our service and sales agency proposition.

Buick	*Franklin*	*Oldsmobile*
Cadillac	*Haynes*	*Overland*
Chalmers	*Hudson*	*Paige*
Chandler	*Hupp*	*Scripps-Booth*
Chevrolet	*Kissel*	*Studebaker*
Cole	*Lexington*	*Stutz*
Dodge	*Marmon*	*Velie*
Dort	*Maxwell*	*Westcott*
Essex	*Nash*	*Winton*



HOUSE

EASY CHANGE



Set of 5 House Wire Wheels, 4 inner hubs, 4 hub caps, hub cap wrench, spoke nipple wrench, one hub dust cover for spare wheel. White, Black, Red; color optional. For Fords, **$65.**

For Chevrolet 490 and Overland Model 4, **$75.**

WIRE WHEEL CORPORATION OF AMERICA

(Successors to Houk Manufacturing Co.)

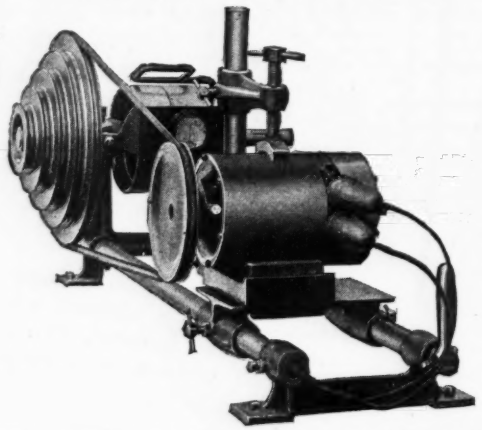
1700 Elmwood Ave. Buffalo, N. Y.

Direct Factory Branches and Service Stations:

New York, 835 11th Ave. at 57th St.
Philadelphia, 328 N. Broad St.
Chicago, 23rd St. and Indiana Ave.
Detroit, 16 Davenport St.
Los Angeles, 1216 S. Grand Ave.
San Francisco, 1690 Pine St.

Exclusive Canadian Representatives:
Dunlop Tire & Rubber Goods Co., Toronto

A GARAGE AND SERVICE STATION NECESSITY



The ONAN TESTING DEVICE

For Testing Electrical Equipment

Tests and drives all kinds of electrical units after they have been removed from the motor. Avoids the delay and uncertainty of having to re-install Generators, Magnetos or other electrical units without being sure they function properly within themselves. You can properly fit new parts, such as Brushes, Platinum Points, Bearings, etc. Avoids all lost time—assures accurate work. Put in operation in a few minutes. Pays for itself in time saved. Price with meter, mounting and cables, $70. Price without meter or cables, $55. WRITE FOR ILLUSTRATED LITERATURE.

DAVID W. ONAN,

1324 Penn Ave. N., Minneapolis, Minn.

OLD SOL SPOTLIGHTS



"OLD SOL"

No. 76 Liberty Searchlight. Price $5.50

Combined Push Button switch and focusing control in handle. Wing nut on bracket for inspection lamp. Double clamp bracket. Duplex wire to battery.

Three-inch mirror integral with lamp body, extra large silver plated reflector. Special high candle power bulb. Black enamel finish only.

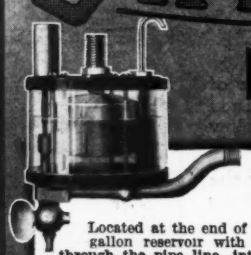
Diameter of lamp front, 7 in. Weight, packed in 9½x6¾x6¾ carton, 4 lbs.

Made and Distributed by

THE HAWTHORNE COMPANY

Grassmere Avenue **Bridgeport, Conn.**

STANDEX



AUTOMATIC LUBRICATING SYSTEM FOR FORD CARS

The Eye that watches your Oil

A MONEY-MAKING PROPOSITION FOR DEALERS

Located at the end of the ordinary Ford gas tank, a gallon reservoir with an accurate gauge, feeds oil through the pipe line, into the Standex Control Chamber, where, by means of a float construction, the ideal level in the crank case is automatically preserved at all times.

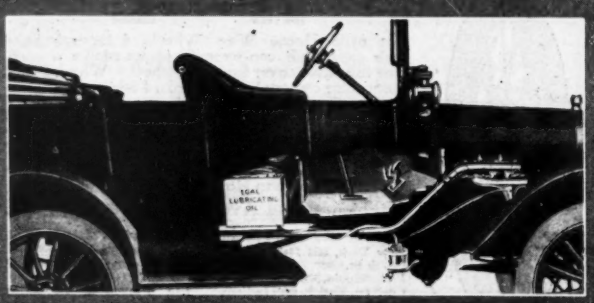
This system prevents a Ford engine from being over-lubricated or under-lubricated.

Order through your jobber, otherwise direct

STANDEX MANUFACTURING CORP.

341-9 East Ohio St. Chicago, U. S. A.

Attractive Literature in Colors on Request





KENNEDY

Auto Covers

Protect Against Dust, Dirt, Moisture and Cold

GARAGE MAN, HERE IS A REAL BET!

Here is a brand new way to keep your garage filled to its capacity this winter—and, in addition, to get the profitable accessory and repair business that will naturally follow.

For a practically nominal investment you can buy a Kennedy Cover for every car in your garage. Just stop and think how your boarders will appreciate having their cars protected from dust, dirt, rust and cold, with a Kennedy Cover when their cars are standing on the garage floor and for permanent winter storage, you cannot beat Kennedy Covers.

Besides, many owners who keep their cars in private garages will jump at the opportunity of getting a Kennedy Cover. KENNEDY re-sale business **pays.**

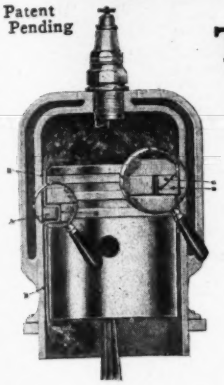
Write today for sizes and prices

THE KENNEDY CAR LINER & BAG CO.

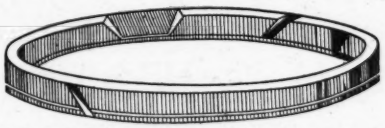
SHELBYVILLE **INDIANA**

Carbon-O Piston Rings

Patent Pending



The Valve Seat Ring



Hold Compression and Prevent Oil Pumping When Ring Groove Is Worn

At last a ring that is designed so it will absolutely prevent all oil leakage and loss of compression. Dealers are doing a big business with this ring. You will find it a big seller. In the illustration, "A" shows how compression leaks past a ring that does not fill the ring groove. "C" illustrates how the inside half of a Carbon-O Valve Seat Ring—cut on a bevel—acts as a wedge that pressing against the top of the ring groove, holds the outside half against the cylinder wall, absolutely preventing oil pumping or loss of compression.

The Only Ring That Fills the Groove YOU Should Be Selling It

Our Guarantee—If after 30 days the purchaser is not satisfied with Carbon-O Rings we will refund the money and pay you a reasonable price for your work in installing the rings.

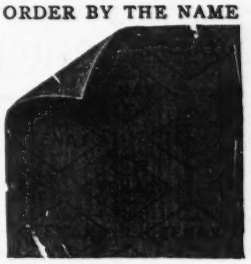
Write for discounts and complete information.

STEAM TRACTOR AUTO MFG. CO.

219 W. 7th St., Sioux City, Iowa

ORDER BY THE NAME

TENAX



Ideal packing for superheated steam, acid or alkali and all other joints. Stands temperature of 1600 degrees Fahr. and pressure of 6000 pounds. Sheets 50 inches by 50 inches. Thickness 1-32 inch to ⅛ inch. Write us for prices and samples. Cut to any size or shape ordered.

Pack with Tenax and forget the joint forever

BRAKEBESTOS

Brake Band Lining



For automobiles, trucks, tractors and all engineering brakes.

Finest long fibre asbestos yarn with wire. Extra long wearing quality. Can't burn or soak oil. Made in all widths and thicknesses. A big seller to the trade who know where to buy.

Write now for our New Automotive Supplies Catalog, or ask your Supply House.

Advance Packing & Supply Co.

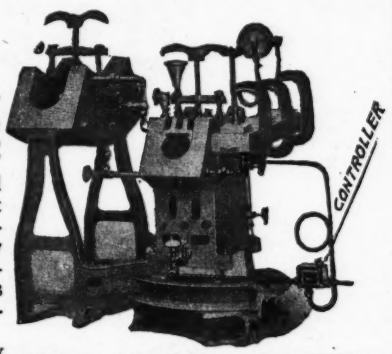
13-15 N. Franklin St. Chicago, Illinois

"That's A Load Off My Mind!"

No more worry—no more "cussin"—no more losses—I've got—

(THE) ALLIANCE CONTROLLER

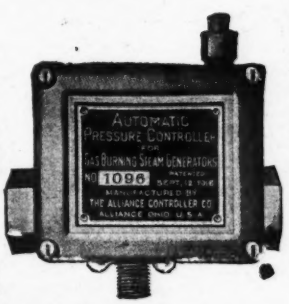
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The Controller is easily adjusted and needs no further attention. Simply light your burner and forget it. Your steam will always stay at the pressure you want to carry



Complete instructions with each Controller. **$7.50 each.**

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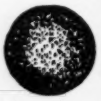
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There isn't a ball bearing on the market that can come up to the quality and construction of the B-N LONG LIFE front wheel bearing for Ford and Chevrolet Cars. The B-N is so constructed that the parts cannot possibly separate, allowing the balls to fall out and jam, as with ordinary bearings. Every one bears our trade-mark—your guarantee. Write for liberal dealer's discount TODAY. We manufacture a large line of "B-N" Replacement parts.

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All outfits complete with switchboard as cut shown.



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means protection to the gears and bearings of your car against excess friction. Insist on the orange can, t'will help to reduce repair bills.



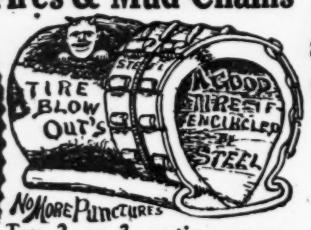
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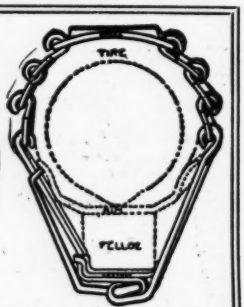


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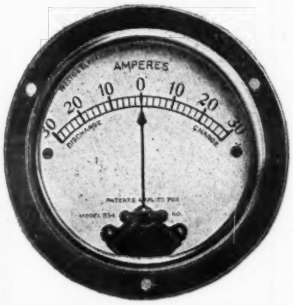
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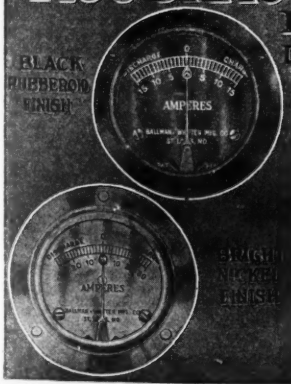
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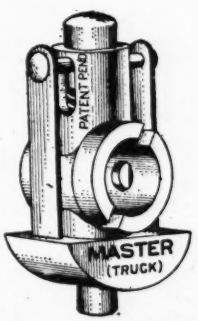
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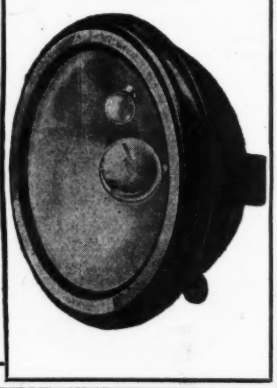
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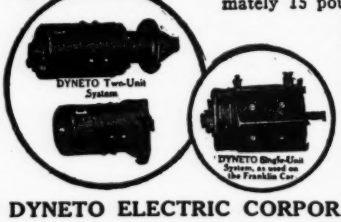
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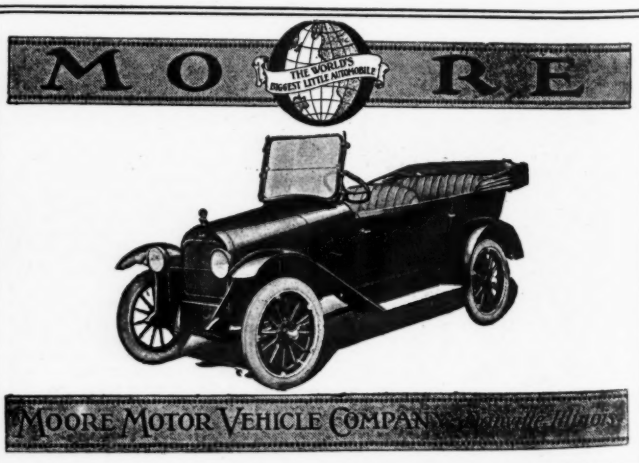
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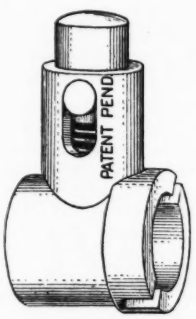
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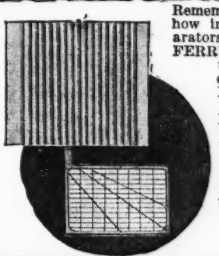
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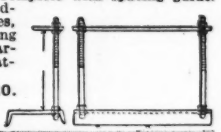
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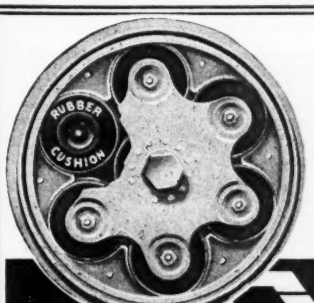
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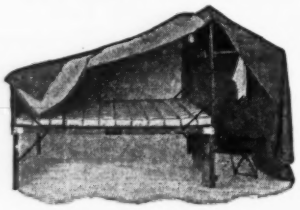
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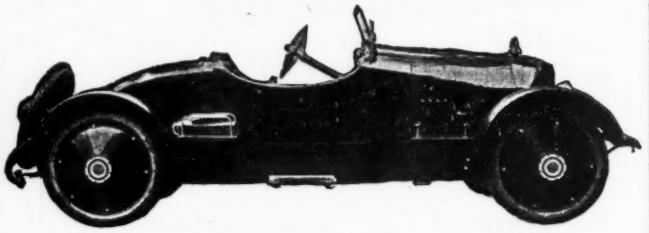
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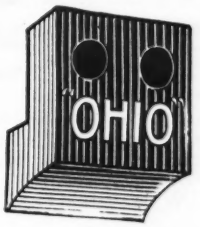
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Trade Mark Reg. U.S. Pat. Office

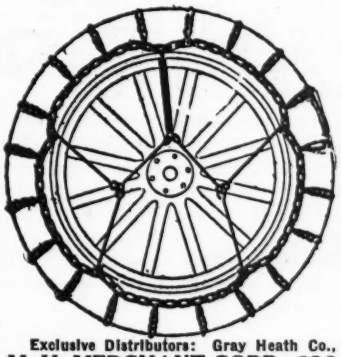
Sioux Tools are the best on the market for

Removing Bushings,—
Re-facing, Re-seating, Grinding
any and all valves

Demand the Best—the "Sioux"
All good Jobbers sell them

ALBERTSON & CO., Mfrs., Sioux City, Ia.

SAVE YOUR TIRES



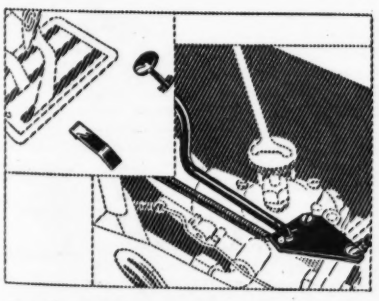
MERCHANT'S ANTI-SKID CHAIN TIGHTENER

Saves your tires from the wear that loose chains cause, by gripping the chain at five points, giving an easy tension all around. Sufficiently flexible to allow the chain to creep properly. Stops noise.

Write for full particulars

Exclusive Distributors: Gray Heath Co., 1440 S. Michigan Ave., Chicago.
M. H. MERCHANT CORP., 236 Emma St., Syracuse, N. Y.

THE SENSE ACCELERATOR for Ford Cars



Mr. Jobber, Dealer and car owner. This accelerator works entirely away from magneto plug and proper distance from brake. Only one working joint which can never bind, built to last. Simple, durable, easy to install; our foot rest enables you to feed your Ford motor steady. Attractive counter displays furnished with orders for one dozen. Special discounts to dealers and jobbers—postpaid $1.50.

C. H. RICE CO. **Cherokee, Iowa**

JACKSON TRAILERS

A complete line of trailers at all prices, for all purposes.



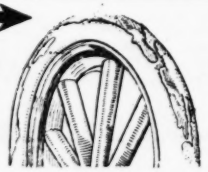
An unusually interesting dealers' proposition. Write for catalog and full information.

Dept. 9

MILES MFG. CO., Jackson, Mich.

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Double the Mileage of Tires Like This



INSURT TIRES reinforce the entire casing, eliminate blow-outs, prevent punctures, add thousands of miles to the life of tires and can be used again and again. Easily adjusted, no tools required, automatically become part of tire. Cheaper and better than retreading.
Distributors and agents write for free details of this Big Money Maker. Why wait till tomorrow? Delay will only lose you money. Act now.

AUTOCESSORY SALES COMPANY
110 N. Dearborn Street **Chicago, Ill.**

LIBERTY SPARK PLUGS



The Federal Corporation
150 No. Elm St.
Westfield, Mass.

You Should Carry:—
The ZIP Spark Plug $1
$2.00

Safety Connection for Tire Pumps— Set it at required pressure—the buzz of the escape valve tells you when to stop. Guaranteed accurate.

Its non-corrosive copper alloy shell will not "freeze" in cylinders or damage their threads.

The Hartley Screw Co., 132 Central Ave., Newark, N. J.
See ad next week—or in MOTOR WORLD this week. Liberal Discounts.

MORTON W. SMITH CO., INC.
19 West 44th,
New York, N. Y.
Announces that they are the sole distributors of the
PORTER MOTOR CAR
"Designed and Built by Men Who Know How"
Designed by FINDLEY ROBERTSON PORTER
Built by THE AMERICAN AND BRITISH MFG. CO.
Chassis: $6,500 F. O. B. Bridgeport, Conn.
Open Territory *Write for Particulars*



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YOU CAN RE-COVER IT YOURSELF
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Ask for Catalogue No. 63
Ask for samples of material.

New roof, and quarters sewed together. New Rear Curtain. Tacks, binding and fasteners. All ready to apply. We furnish printed instructions with each top. Give us name of your car, year and model number and we will quote you exact prices.
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LYCOMING MOTORS
MAKE A FRIEND OF EVERY OWNER

Rims
Axles
Springs
TRADE MARK
Stan-Par
Replacement Springs
Tubing
Rods, etc.
Bearings
THE STANDARD PARTS COMPANY, CLEVELAND, OHIO

MERCER MOTOR CARS

THE Mercer shield is the badge of fastidious taste in automobile. Mercer means the utmost in substantial smartness, riding comfort, and power. The possessor of a Mercer invariably feels a bit better satisfied than the owner of another car. Correspondence from dealers invited.

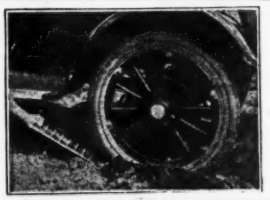
Mercer Automobile Company, Trenton, N.J.
800 Whitehead Road



BOSCH
America's Supreme Ignition System
AMERICAN BOSCH MAGNETO CORPORATION
Main Office and Works: Springfield, Mass.
Branches: New York Chicago Detroit San Francisco

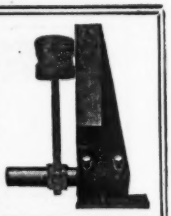
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3 IN 1 TROUBLE TOOL

Prevents wheels spinning when car is stuck in mud, gravel, sand or snow. Forms perfect traction. Makes bad roads safe. Does not damage tires. Also used as shovel and as a firm foundation for a jack. Price $1.50. Order a sample and details of our dealer proposition.
ALSTEEL MFG. CO.,
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Battle Creek, Michigan.



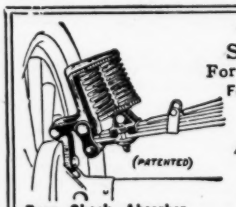
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Makes a quick bench work job out of the old back breaking method. Saves eight to ten useless fittings. Work completed in one-fifth of former time. Accurate and efficient. Price, with one arbor as selected, $24.50. Write for descriptive circular.
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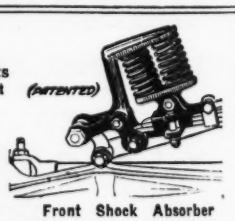


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4 Cyl Model · 114" Wheel Base
$1395 00 F.O.B. FACTORY
BELL MOTOR CAR CO., YORK, P.A.

"CHAMPION" Shock Absorbers
For 'Ford' Cars & Trucks
Four Absorbers in Car Set
WRITE
Champion Shock Absorber Sales Co.
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(PATENTED)
Rear Shock Absorber



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YANKEE TIRE PUMP

Easiest operating—most powerful—convenient Tire Pump ever produced. 90 lbs. before you know it. Fastens to running board of car. Folds into tool box. Infallible. Price $5.00 East of Rockies.
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Inner armor for automobile tires prevent punctures and blow-outs. Double mileage of any tire, old or new, easily applied without tools. Used over and over in several tires. Will not heat or pinch. Cheaper and better than double treads, etc. Details free. Distributors and agents wanted. Sales guaranteed.

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$H_2O + C = H_2 + CO$

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A Selling Corporation

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The most reliable filling station made.
Will make big profits for you.

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VISIBLE SPARK PLUG CO. Pittsburgh, Pa.



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for fly wheels of all cars.

REPLACES the cast teeth of original fly wheel. Give diameter, and number of teeth, on fly wheel, and write us for prices.

Prompt Service

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Save Expense

Add to your hauling capacity at minimum cost by getting a Watson Tractor-and-Trailer outfit. Quicker, stronger, cheaper, easier to handle.

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You can depend upon J. C. M. Radius Rods to give years of service—put them on and forget about them. For the rods are inserted and clamped into a patented socket at the head end—not brazed or welded.

Dealers write for our special trade proposition on J. C. M. Radius Rods and J. C. M. Auxiliary Braces.

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NON-BURN
ASBESTOS BRAKE LINING
H. W. JOHNS-MANVILLE CO.
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10 *Factories—Branches in 63 Large Cities*

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MAKE GOOD—OR WE DO
Dealers Sell Them On That Basis

Hill 3-A Spark Plugs cannot short circuit, leak compression, foul, or break. The design specifically provides against these evils. DEALERS—They will GO ON and STAY on the meanest motor that ever pumped oil. Order a set and prove it. Price $1.25. Liberal discounts.

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515 W. 42d St., New York City

SEE PAGE 5



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BEACH PAT. PEND.

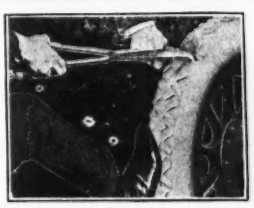
Has the rim off in about 30 seconds and takes the backache out of this job. Fits all types and sizes of split rims. Especially adapted to Kelsey rims. A 10 days' trial—retails at $7.50. Dealers and jobbers write for proposition. Liberal discounts.

We also make Greb Automatic Grip Puller and Greb Auto Lock

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Scientifically built to assure more mileage

Thermoid
CROLIDE COMPOUND
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MICHELIN TIRES



HIGHEST QUALITY—MODERATE PRICE

Dealers are invited to write for Michelin's attractive proposition

MICHELIN TIRE CO., Milltown, N. J.

19 Wholesale Branches Assure Prompt Service

DISTRIBUTORS WANTED FOR

Guaranteed for the life of the car

Laursen HYDRAULIC GEAR SHIFT

EVERYONE WANTS IT

U. S. AUTO GEAR SHIFT CO., 122 S. Michigan Ave., Chicago

FEUMORT FIRE EXTINGUISHER

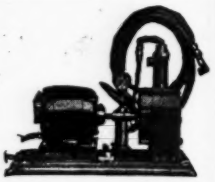


—the new fire-fighting dry chemical guaranteed to extinguish a fire in less than two seconds. It is put up in one-fourth gallon handy metal cylinders which have the extinguishing power of 41 gallons of water.
Feumort has no pumps or valves to rust or corrode. Fits on any car or truck. $5.00 each.

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160 Fifth Ave. New York City

The "LongStroke" COMPRESSOR

(Write for descriptive folder)



MOTOR-COMPRESSOR CO.
52-60 Dickerson Street, Newark, N. J.

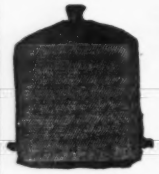
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Make big money selling this 2½ in. brass core radiator. Interchangeable with regular Ford, fits Ford shell. Retail Price complete $21.00. Less shell $19.50.

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Swings in a 9 ft. circle. Water and light where you need them.

All joints guaranteed.

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Bulldog Tread—Non-Skid Fabric—plain Tread and Super Cord. Dealers—
We have a live proposition for you. Write.

6,000 Mile Fabric — Distributed by ACORN TIRE AND RUBBER Co. — 10,000 Mile Cord

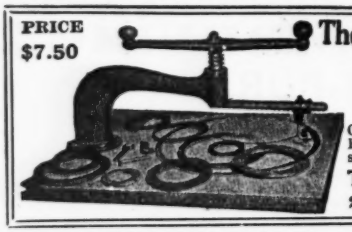
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—hand made
—pure materials only
—no fillers
—an extra ply fabric in most sizes

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PRICE $7.50



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Lamp Glass, Sheet Copper and Rubber Gaskets, Felt and Fiber Washers, Etc.

Capacity any size circle from 0 to 14 in. Positive measuring scale to determine sizes. Manufactured by

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"For Business"
1-1½ and 1½-2 Ton
CAPACITIES

FULLY EQUIPPED with impulse starter, electric lights, windshield and bumper.

The Commerce Motor Car Co.
Mfrs. of Motor Trucks
DETROIT, MICHIGAN
9th Year

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Splendid equipment — $2000.00

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Glass Founders Corporation Milltown, N. J.

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Install General Storage Battery Service

Under our ironclad twelve months guarantee, *backed by the factory*, the service station man is selling the BEST BATTERY—with solid assurance to rely upon. No adjustment-guarantees to make profits dwindle.

A Square Deal to Every Customer.

General Constant Duty Storage Battery

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Full Line of Parts For All Makes of Storage Batteries.

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Bergdoll	Dixie Flyer	Henry	Michigan	Pontiac	Tulsa
Berkshire	Dort	Henderson	Midland	Premier	Vaughn
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Birch	Drexel	Hudson	Mitchell	Pullman Jr.	Virginian
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Cadillac	Elmora	Jones	Moon	Ross	Whiting
Carhart	Elsworth	Jordan	Moyer	Sampson	Whitcomb
Campbell	Empire	Kelley	National	Saxon	Wichita
Carnation	Enger	King	New Era	Scripps-Booth	Yale
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For six years that object has been attained.
Now we have something **bigger and better than ever** for our thousands of patrons.

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No matter what you order—where it is made, how little or how much it costs, we will deliver it to you, if it is within our power to obtain it.

This means, that in addition to our Used Parts Service, we have, or will get for you, Any New Parts or Material that can be purchased for any car.

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WARSHAWSKY'S SERVICE IS COMPLETE.
It Stands Alone.

It is impossible for us to list on the opposite page more than a small part of the bargains we have for you—so if you don't see there what you want—

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If It's AUTO PARTS You Want

Wire—Write—or Come to Warshawsky

Every Used Part Is in First Class Condition, and Will Render Satisfactory Service. If We Cannot Satisfy You, Your Money Will Be Cheerfully Refunded

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All in Excellent Condition

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Hair and Leather in Any Quantity

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For All Standard Makes of Cars
NEW & USED GEARS & BEARINGS

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14,000 ft. new radiator hose. Price per ft., 1-in., 15c; 1¼-in., 17½c; 1½-in., 20c; 1¾-in., 22c; 2-in., 25c; 2¼-in., 27½c; 2½-in., 30c; 2¾-in., 32½c.	
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New Johnson Shock Absorbers, complete, per pair	$10.00-12.00
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Single Barrel Pumps	1.50
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New Radius Rods for Fords	1.75
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Ray Shock Absorbers, for Fords, set of four	5.00
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11 inch single bulb	$6.00
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Electric tail lights	.85
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Price per ft.

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Price per ft.

1¼-in., 25c	1½-in., 30c
1¾-in., 35c	2-in., 40c
2¼-in., 45c	2½-in., 50c

New Bailey Differentials for Overland Models 80, 81, 83 ..... $10.00

PREST-O-LITE TANKS

Model B ..... $5.00 each; E ..... $3.50 each
Searchlight Tanks $2.50

New and Used Rims—
All Makes

New Pneumatic and Solid Truck Tires
GOOD USED TIRES AND TUBES
OBTAINED FROM WRECKED CARS
WRITE FOR PRICES

30x3	$1.75	34x4	$3.00
30x3½	2.00	36x4	3.50
32x3½	2.25	35x4½	3.25
32x4	2.50	36x4½	3.50
33x4	3.00	37x4½	3.75

NEW RELINERS

MAIL ORDERS SHIPPED SAME DAY
HIGHEST PRICES PAID FOR WRECKED CARS

NU4 Bosch	$15.00
ZR6 Bosch	50.00
ZR4 Bosch 2 spark	100.00
Eisemann Dual	15.00
Remy Model RL & D	7.00
Dixie Mags.	12.00
New Dixie Mags. 4 cyl.	18.00
New Sims H T.	18.00
Mea	12.00
New Splitdorf Type E	12.00

COILS

Bosch Type A	$7.50
Bosch Duplex	4.00
Eisemann	4.00
Splitdorf	4.00
Silent Starter and Generator Chains; all lengths and sizes.	
New 8-cyl. Delco distributors.	12.00

MOTOR GENERATORS

Wagner 13 Studebaker	25.00
Jesco	25.00
20 Delco	30.00
Gray & Davis 2 Unit	35.00
Westinghouse S W 1158 A	30.00
New Remy Model 180B 6 volt Starter and Generator	60.00
Remy 5, 6, 3, SJ2, 535	35.00
Disco 16 E—12 volt	35.00
Apple, Mod 28 A	25.00
Intz Chalmers	35.00
Northeast	20.00
Apple—A28 for Mitchell	25.00

GENERATORS

New Remy Generators (Round Type) with relay	18.00
Westinghouse with distributor 230-221	25.00
Leece-Neville, 12 volt	16.50
Northwestern	10.00
Autolite	10.00-15.00
New Westinghouse 209 R	20.00
Gray Davis G. G. I. C.	15.00
Ward Leonard AG T	10.00-12.00
Splitdorf	12.00
Vesta	12.00
Berdon	10.00
Delco Oakland	10.00
Bijur. Series 51-30-5	15.00
Ward Leonard for King	15.00
Rushmore No. 1	15.00

STARTERS

Bijur Apperson	25.00
Allis Chalmers	15.00
Remy 182	20.00
Packard	20.00
Deaco	20.00
Starter for Palmer Singer	20.00
Westinghouse 533-S W 103	25.00
Allis Chalmers	15.00
Wagner for King	20.00
Autolite No. 7049-2407-6145	15.00- 20.00
Autolite for Abbott	15.00
Gray Davis Chalmers	20.00
Leece-Neville Haynes	20.00
Gray Davis, Lozier and others.	30.00
Autolite, Overland 79, 81, 82.	15.00-20.00

SECOND-HAND CAR DEPT.
$150.00 to $550.00
50 to 75 exceptionally good used cars at prices so low that they would even interest dealers.

SPEEDOMETER HEADS

Stewart or Warner	$1.50 to $4.00
New Stewart flush type	5.00
Pyrene Fire Extinguishers	6.00

DEPOSIT REQUIRED WITH ALL ORDERS

WARSHAWSKY & CO.

LARGEST CAR WRECKERS IN THE WORLD

1915 SOUTH STATE STREET **PHONE CALUMET 7315** **CHICAGO, U. S. A.**

SAVE TIME—Parts for 80 Cars

50% TO 90% OF

Write—Wire—Phone

LARGEST CAR WRECKERS BET

Fort Dodge Aut

507-9-11-13 First Avenue

We have a large list of satisfied customers throughout Iowa, Minnesota, North and South Dakota, Wisconsin, Montana and in fact in nearly every state of the Union.

If you're not satisfied with any parts let us know and we'll gladly refund your money. That's our guarantee.

All orders shipped same day received.

All our parts are carefully inspected before being shipped out. Nothing but first class serviceable parts sent.

The following is a partial list of cars we have parts for:

Abbott-Detroit
Allen
Auburn
Briscoe 1916-18
Buick 25-29-31-37
Chalmers 30-40
Chandler 1916-17
Case 40
Chevrolet 490
Chevrolet Baby Grand
Cross Country Rambler
Crow-Elkhart
Detroiter
E M F 30
Empire 1913-15
Carter Car
Cadillac 1911 to 1914
Everett 30
Flanders 20
Ford
Franklin
Hudson 20-33-37
Hupmobile 20-32
Jackson
Jeffery 1914-15
Krit
Marion
Michigan
Maxwell 25, 1914 to 1917
Maxwell Special
Maxwell Six
Moline
Metz
Mitchell
Oakland 35-40
Oakland Six 48
Overland 49-59-60-61-69-71-79-83-86
Pope-Hartford
Partin-Palmer
R. C. H.
Rambler
Reo 1911 to 1917
Regal 1911 to 1915
Saxon Six
Stoddard-Dayton
Saxon Four Roadster
Studebaker Four
Studebaker 6, 1914 to 1917
Studebaker 25
Warren 1913 to 1915
Winton Six

Special Motor Bargains

Stearns-Knight 4 cylinder	$135.00
Continental 6 with Starter	140.00
Jackson, 4 cylinder	135.00
Studebaker 25, 4 cylinder	75.00
Buick, taken from 31	85.00
Overland 79	75.00
Overland 69	65.00
Ford	70.00
Metz 1915, Starter and Generator	75.00
Maxwell 1914, Simms Magneto	75.00
Maxwell 1917, Starter	1.00

Magnetos

Bosch NU4	$14.00
Bosch DU4, Set Spark	22.50
Bosch DU4, Variable Spark	25.00
Bosch DU6	30.00
Bosch DR4	19.00
Bosch DR6	25.00
Eisemann	15.00
Dixie	10.00

Low Tension Magnetos

Remy, Splittdorff	$5.00 each
Coils for same	3.00 each

Generators

Wagner for Studebaker	$20.00
Delco	25.00
Gray & Davis	15.00
Simms Huff Generator and Starter	25.00
Auto Lite for Overland 86	15.00
Auto Lite for Chevrolet 490	15.00
Deaco	15.00

—200 Models—SAVE MONEY

F MFR'RS LIST

or Come TODAY to

WEEN CHICAGO AND DENVER:

o Wrecking Co.

South, Fort Dodge, Iowa

Starters

Auto Lite for Overland 86	$20.00
Auto Lite for Chevrolet 490	15.00
Gray & Davis for Overland 79	10.00
Wagner for Studebaker	15.00
Deaco	18.00

REAR AXLES

For most any make of car. New and used from....$2.00 up

Specials in Radiators
New for Ford $20

Good Serviceable Used Ford Radiator 1914-15-16	$15.00
Saxon 6 Radiator	30.00
Saxon 4 Radiator	15.00
Studebaker 6, 1913-14-15	25.00
Studebaker 4, 30	25.00
Studebaker, 25	20.00

Reo 1913-14	$20.00	Krit 1912-13	20.00
Rambler 1913	22.50	Jackson 1913-14	20.00
Paige 25	20.00	Hudson 33	25.00
Overland 86	25.00	Hudson 37	25.00
Overland 83	25.00	E. M. F	25.00
Overland 81	25.00	Empire 31	20.00
Overland 1914, 79	20.00	Chevrolet 490	25.00
Oakland 25	22.50	Chalmers 1913	20.00
Maxwell 25	20.00	Buick 31	25.00
Maxwell 1914, 25	20.00	Buick 25	25.00
Maxwell 1916-17	25.00		

Speedometer Heads

Stewart	$1.00
New Stewart Swivel Joints	1.50
Stewart Chains, Cables Right Length	1.00

Large Supply Reo Parts

Reo Crank Case	$25.00
Cylinder Block	15.00

Write for Prices

SPECIALS

New Parts

Front Springs, 7 leaf, for Fords	$ 2.15
Headlights, Electric, for Fords, pair	4.25
Rear Springs for Fords	7.25
Radiators for Fords	20.00

Prest O Lite Tanks

Style B.....$4.00 Style E.....$3.00

New Wheels for Fords

Front **$4.25**
Rear **4.75**

Springs

We can furnish you springs for any make of car; if we do not happen to have a first class used spring, we will send you a brand new one, at 75 per cent off manufacturers' list.

Cylinder Blocks—75% Off

We have first class serviceable cylinder blocks for practically every make of car.

Transmissions

Reo, Buick, Auburn, all independent transmission from $20.00 and up.

Carburetors $6

Rayfield, Zenith, Schebler and other makes, $6.00 and up.

FOR IMMEDIATE DELIVERY
NEW MATERIAL IN LARGE QUANTITIES

WESTON AMMETERS

Weston Ammeters, model 354, flush type black enamel finish, 20-0-20.....each, $2.50
Lots of 12, each, 2.20

U. S. L. BATTERIES

U. S. L. 6-volt, 90-amperes starting and lighting batteries, model Ad-313-DF. Height 9 inches. Width 4¼ inches. Length 20⅜ inches. These batteries were built for export and cost originally much more than the domestic. Jars are unbreakable. These batteries have been shipped dry. Cells contain no solution and are sealed to exclude air. Batteries ready for solution and service.....each, $22.00
Lots of 10, each, 19.00

Batteries are used on the following cars:

Briscoe: 16-17-18—Mod. 4-24
Buick: 1914-15—Mod. B-36-37-54-55
Chevrolet: 1917-18—Mod. Ad-4-DS (slightly larger)
Glide: 16-17-18—Mod. AD-6-40
L. P. C.: 14-15-16—(Roadster)
Madison:
Hastings:
National: 16-17-18—Mod. Highway 6
National—Mod. Highway 12 (4-11/16 wide)
Overland: 1915—Mod. 80-81-82
Overland 1916—Mod. 83-83B-86
Overland: 1917—Mod. (85-4) (85-6) (88-6)
Overland: 1918—Mod. (85-6B) (89-6)
Premier: 17-18—Mod. (6-C)
Ross: (3-13/16 wide)
Standard: 13 to 17
Trumbull: 1915-1916

AUTO LITE GENERATORS

Electric Auto Lite 6-volt lighting generators model GD-1001 with cutout. Originally used on Overland cars. Can be installed on practically any car.....each, $25.00
Lots of 10, each, 21.00

AUTO LITE STARTERS

Electric Auto Lite Starting Motors model MC-1070 with Bendix Drive. Fits model 83 and 85 Overland cars. Can be installed on others.....each, $25.00
Lots of 10, each, 20.00

AUTO LITE STARTING SWITCHES

Electric Auto Lite Starting Switches model SW-1600. Fits model 83 Overland and others.....each, $1.50
Lots of 10, each, 1.35

WHITNEY SILENT CHAINS

Whitney Silent Chain No. 1201, 35½ inches long, 94 links.....each, $2.50
Lots of 25, each, 2.00

LAMPS FOR FORDS

Ford Oil Side Lamps to fit 1915-16-17-18 Ford Cars, price, per pair.....$2.50
Ford Oil Tail Lamps to fit 1915-16-17-18 Ford Cars, price, each..... 1.30

BEARINGS

10,000	No. 202-B	Seubert Annular Single Row bearings, ea.	$1.00 Net
2,800	No. 308	S. R. B. Annual Single Row bearings, ea.	3.75 Net
7,200	1310	N. D. Annular Single Row bearings, ea.	5.38 Net
6,600	1310	W. M. Annual Single Row bearings, ea.	5.38 Net
140	1408	N. D. Annual Single Row bearings, ea.	5.50 Net
700	307	W. M. Annual Double Row bearings, ea.	4.38 Net
156	0210	N. D. Radax, ea.	3.50 Net
300	319	Timken cones, ea.	2.10 Net
125	385	Timken cones, ea.	2.84 Net
990	444	Timken cones, ea.	3.26 Net
303	313	Timken cups, ea.	.95 Net
175	383	Timken cups, ea.	1.37 Net

Much better quotations in larger quantities. Large quantities of other material. Send for new list to be issued shortly. We sell Wholesale only.

S. BREAKSTONE

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"We Tear 'Em Up and Sell the Pieces"

Parts for Over 300 Models of all Standard Make Cars

GUARANTEE: Positively Every Part Sold Guaranteed to Be As Represented or Money Promptly Refunded.

The Greatest Bargain List of High Grade Guaranteed Used Parts Ever Assembled

Read Every Item Each is a Bargain All Guaranteed

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Send for list
$30.00-$150.00

UNIT POWER PLANTS
Send for list
$75.00-$200.00

REAR AXLES
$25.00-$75.00

FRONT AXLES
$5.00-$15.00

RADIATORS
$10.00-$30.00

WHEELS
$2.00-$7.50

STARTERS
$15.00-$30.00

GENERATORS
$12.50-$20.00

WINDSHIELDS
$6.00-$10.00

LAMPS
$3.00-$8.00

BEARINGS
Any style or kind
50c-$5.00

SPRINGS
$3.00-$7.50

SPRING LEAVES
25c-50c

TUBE VULCANIZERS
50c

RIMS
$2.50-$4.00

FELLOE BANDS
$1.00-$1.50

CRANKCASES
$10.00-$50.00

CYLINDERS
$5.00-$30.00

CRANK SHAFTS
$5.00-$30.00

CONNECTING RODS
$1.50-$5.00

PISTONS
$1.00-$3.00

TIRES

5,000 Miles Guaranteed

Here's Your Chance to Save!

30x3½	Rib	$12.88
31x4	Rib	20.05
31x4	Non-Skid	21.74
33x4	Rib	21.60
33x4	Non-Skid	22.20
34x4	Rib	21.02
34x4	Non-Skid	23.81
34x4½	Rib	30.06
35x5	Non-Skid	41.36
36x4½	Rib	31.52
36x4½	Non-Skid	33.91
37x5	Rib	38.62
37x5	Non-Skid	43.54

All Fresh, New Stock and Fully Guaranteed

DIFFERENTIALS
$10.00-$20.00

AXLE SHAFTS
$1.50-$7.50

RING GEARS
$1.00-$20.00

TRANSMISSION GEARS
50c-$20.00

SPOT LIGHTS
$5.00

SPARK PLUGS
25c-75c

TRANSMISSION CASES
$7.50-$25.00

DIFFERENTIAL GEARS
50c-$1.50

Reliners

	Each
28x3	$0.75
30x3	.75
Lots of 6	.60
30x3½	1.50
Lots of 6	1.25

Inside Blowout Shoes.

3, 3½ or 4 in. $0.25
Dozen Lots 2.25

Patch Outfits With Cement in Cartons

30 sq. inches—
Reg. Price $0.50
Our Price .25
Doz. Lots 1.80

JACKS
$1.00-$8.75

GASOLINE TANKS
$2.00-$7.50

PRESTO TANKS
$5.00-$6.00

COLD PATCHES
10c Dozen

METAL POLISH
10c-15c-25c

TOP COVERS
$1.50

TRANSMISSION
$25.00-$50.00

CARBURETORS
$3.00-$15.00

72 sq. inches—
Reg. Price $1.00
Our Price .50
Doz. Lots 3.60
144 sq. inches—
Reg. Price $2.00
Our Price 1.00
Doz. Lots 7.20

Vulcanizing Cement

1 Pint Can $0.50
1 Quart Can .75

Cotton Gloves Just the Thing for Working Around Auto

Single Pair $0.15
6 Pair .75
1 Doz. Pair 1.25

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Auto Wrecking Company

13th and Oak Street **Kansas City, Mo.**

PARTS FOR ALL CARS

We Save You 50 to 80% of the Original Cost

SATISFACTION OR YOUR MONEY BACK

Magnetos Overhauled and Guaranteed

Bosch DU4 Variable.....$27.50	Bosch DR4.....$19.50	Bosch D6.....$15.00
Bosch DU4 Set Spark..... 25.00	Bosch DR6..... 20.00	Eisemann 12.00
New Bosch DU4 Variable 35.00	Bosch ZR6..... 35.00	Remy 6.00
Bosch DU6..... 29.00	New Bosch ZR6..... 40.00	Dixie 12.00
	Bosch D4..... 14.00	

PREST-O-LITE TANKS

Model B. Each	$5.00
Model E. Each	3.50
Searchlite Tanks. Each	2.50

COILS

Bosch Type A	$6.50
Eisemann	3.50
Splitdorf	3.50

STARTERS

Gray & Davis	$14.00
Auto Lite, Bendix Drive	17.50
Jones Starter and Generator	20.00

GENERATORS

Gray & Davis	$14.00
Remy	12.00
Vesta	10.00
Silent Starter and Generator Chains, all lengths and sizes.	
Lighting and Starting Batteries	$6.00 to $15.00
Rims	1.50 to 3.50
Carburetors	3.50 to 7.50

NEW GEARS, AXLE SHAFTS, and Bearings for All Cars

REBUILT BATTERIES
Guaranteed for Six Months
6 Volt Starting and Lighting $13.50
12 Volt $18.50

COMPLETE PARTS
For All Models Overland Cars

MOTORS
In Excellent Condition

Wisconsin 4 cyl. 4 point suspension	$100.00
Continental, Model E	75.00
E. M. F. 30	50.00
4 cyl. Studebaker 25	50.00
4 cyl. Everett 30	45.00
4 cyl. Davis 30	50.00
Overland 69	60.00
Overland 79 with starter	80.00
Overland 83A with starter and generator	100.00
Overland 83B block motor with starter and generator	90.00

UNIT POWER PLANTS

Continental, Model E	$115.00
Chalmers 30	65.00
Rutenber Cyl.	80.00
Radiators	$10.00 and up
Speedometer Heads	$1.00 to $3.00
Axle Shafts	2.50 to 7.50

Front Axles **Springs**
Rear Axles **Transmission Gears**
Transmissions **Differential Gears**

Roller Ball Bearings (All Makes), $1.00 to $3.50. Pistons, Cylinder Blocks, Crank and Camshafts, etc.

If You Don't See What You Want—Tell Us Your Needs

TIRES AND TUBES

NEW

NEW, FRESH STOCK

Exceptional Bargains

Size	Tires	Tubes	Size	Tires	Tubes
28x3	$ 8.60	$1.85	35x4	$20.60	$3.50
30x3	8.35	1.80	33x4½	23.60	3.75
30x3½	10.80	2.20	34x4½	24.40	3.90
32x3½	12.70	2.30	35x4½	25.50	4.05
34x3½	14.80	2.70	36x4½	25.90	4.60
31x4	16.65	2.85	35x5	29.10	4.90
32x4	16.95	2.90	36x5	29.90	4.75
33x4	17.70	3.00	37x5	30.75	4.90
34x4	18.10	3.10			

ADD 10% FOR NON-SKID

SPECIAL NEW CLINCHER TIRES

32x4....$10.00 33x4½....$12.50 34x5....$12.50

Our Slightly Used TIRES AND TUBES Obtained from Wrecked Cars Mean Economy to You—A Trial Will Convince You

Size	Tires	Tubes
30x3	$ 4.50	$1.35
30x3½	5.50	1.45
31x3½	5.75	1.50
32x3½	6.00	1.50
34x3½	6.50	1.60
31x4	7.00	1.65
32x4	7.75	1.60
33x4	8.50	1.70
33x4½	9.00	1.75
34x4	8.50	1.70
35x4	9.00	1.75
34x4½	9.00	1.75
35x4½	9.25	1.80
36x4½	9.50	1.85
38x4½	15.00	2.50
40x4½	15.00	.....
42x4½	25.00	4.00
35x5	10.25	2.00
36x5	10.25	2.00
37x5	10.75	2.20
38x5½	15.00	.....
40x4 Non Skid	15.00	.....
43x4½ Cl. Non Sk.	15.00	.....

DOUBLE TREAD TIRES

Selected from best used material obtainable

Reliners Free with Each Tire

Two tires, one with good top and other with good sidewalls are trimmed, cemented and sewed firmly together by Campbell lock stitch method, twelve to fourteen plies fabric making puncture and blowout almost impossible.

Size	Complete tire	You furnish one tire	You furnish both
28x3	$ 4.15	$3.00	$1.50
30x3	4.75	3.35	1.50
30x3½	5.80	4.25	2.00
31x3½	6.50	4.50	2.00
32x3½	6.75	5.25	2.00
34x4¾	7.00	5.60	2.25
31x4	6.95	5.75	2.50
32x4	7.15	5.65	2.50
33x4	7.80	6.25	2.50
34x4	8.00	6.45	2.50
35x4	8.75	7.15	2.50
36x4	9.40	7.50	2.50
33x4½	9.25	7.60	3.00
34x4½	9.65	8.00	3.00
35x4½	10.15	8.20	3.00

Express Must Be Prepaid on Old Tires Sent To Us.

5% Off for Cash in Full with Order. Deposit Required with All Orders. Get Our Prices on New Tires.

MOTOR SALVAGE CO.

Full Cash Refunds, less Express Charges, Allowed on Returned Goods. Prompt Attention to Your Orders.

1425 S. State St. **Chicago, Illinois**

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"A MILLION PARTS"

Indianapolis **Indiana**

PARTS for Most Makes of Cars

25% to 75% Off List Price

Here is a partial list of cars for which we have parts. If the name of your car is not listed send us the old part, as we guarantee to return at our expense if not duplicated.

Allen	Clark	Ford, Model S	Krit	Nyberg	Pilot	Silent Knight
American	Cole	Great Western	Leader	National	Pope-Hartford	Speedwell
Apperson	Columbia	Haynes	Lexington	Oakland	Premier	Standard Electric
Auburn	Continental	Henry	Little	Oldsmobile	R. C. H.	Sterns
Auto Car	Cutting	Hudson	Locomobile	Overland	Rambler	Stoddard-Dayton
Brush	Davis	Hupp	Lozier	Packard	Randolph Truck	Studebaker
Buick	Detamble	I. H. C.	Lyons-Knight	Page	Regal	Thomas Detroit
Brown Truck	Dort	Interstate	Marion	Paige Detroit	Regal Under-slung	Thomas Six
Cadillac	E. M. F.	International	Marmon	Parry	Reo	Waverley Electric
Carnation	Elmore	Jackson	Matheson	Parry-Knight	Richmond	Wayne
Carter Car	Empire	Kelly Truck	Maxwell	Pathfinder	Sampson	Wescott
Case	Everitt	Kissel-Kar	McFarlan	Peerless	Service Truck	Winton Six
Chalmers	Flanders	Knox	Mitchell	Pierce Arrow		Zipp
Chevrolet						

We have an enormous stock of parts for orphan cars. Also great numbers of motors, rear systems, transmissions, etc. *We Are the Largest in the State*

Prompt Service
Satisfaction Guaranteed

AUTO PARTS

FOR ALL CARS

MONEY CHEERFULLY REFUNDED

Overhauled and Guaranteed

MAGNETOS

Bosch D. U. 4 Set Spark	$22.50
Bosch D. U. 4 Variable	25.00
Bosch D. U. 6	27.50
Bosch D. R. 4	20.00
Bosch D.R. 4—2 spark	65.00
Bosch D. R. 6	25.00
Bosch D. 4	15.00
Bosch D. 6	16.00
Bosch D. 6—2 spark	45.00
Eisemann 4 Cyl	12.00
Mea	10.00
Remy	5.00
Splitdorf	5.00

COILS

Bosch, Type A	$ 6.00
Eisemann	3.50
Splitdorf	3.50

STARTERS

Gray & Davis	$15.00
Delco	20.00
Jones Starter & Gen.	17.50
Apple Starter & Gen.	20.00

New Gears and Shafts for 200 Cars

PREST-O-LITE TANKS MODEL B, $4.00; MODEL E, $3.00

Searchlight Tanks, $2.00

New Bosch D U 4 Variable, $32.50. Write for special quantity prices.

EXCELLENT 2ND HAND TIRES AND TUBES

Obtained from Wrecked Cars—Solid Truck Tires

5% Off for Cash in Full with Order — *Write for Prices* — Deposits Required With All Orders

MOTORS ONLY

4 Cyl. Packard 30	$90.00
4 Cyl Excellsior	75.00
4 Cyl. Pierce Arrow	90.00
1916 Briscoe	75.00
4 Cyl. Continental, Model R	65.00
R. C. H.	65.00
Overland 59	60.00
4 Cyl. Ruttenberg	65.00

RIMS

All Makes and Sizes ..... $2.00 up

All Parts for 2 Cyl. Grabowsky Trucks.

Front and Rear Axles, Axle Shafts.

Complete Rear Ends.

Transmissions — Universal Joints.

Bearings — All makes and sizes.

Differentials—Gears, Springs, Radiators, etc.

SCHEAFFER AUTO PARTS CO.

1610 S. State St.
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SAVE 35% TO 90% ON AUTO PARTS

By dealing with us.

We have one thousand tubes of a Nationally advertised brand—Standard make; slightly used; 32x4½; 33x5. While they last, each $2.50

Nationally Advertised Tires—Brand New

30x3½ Non Skid ..... $11.00 32x4 Non Skid ..... 21.50 36x4 Non Skid ..... 35.00 37x4½ Non Skid 37.50

New ring gears, pinion gears axle shafts and springs for most any make of car at a great saving.

Parts carried in stock for almost all cars, following is partial list:

Alter	Cadillac	E M F 30	Hupmobile	Little	Oldsmobile	Premier	Stoddard-Dayton
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American	Case	Firestone	Jackson	Matheson	Packard	R C H	Studebaker—all models
Apperson	Chalmers	Flanders	Kissel	Maxwell	Paige	Regal	
Atlas	Chevrolet 4-90	Ford	Knox	Michigan	Palmer-Singer	Reo	Thomas Detroit
Auburn	Cole	Great Western	Krit	National	Parry	Schacht	Warren
Bimel	Elmore	Haynes	Argo	Nyberg	Peerless	Speedwell	Winton
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BARGAINS IN NEW SPRINGS

Overland 75-90 Rear ..... $8.00 Ford Fronts ..... 2.50 Ford rear springs 6.75

One of the largest and most moderate priced Auto Parts Concerns in the Middle West.

INDIANA AUTO PARTS AND TIRE CO.

COHN BROTHERS

318 N. Illinois St., **Indianapolis, Ind.**

PATHFINDER OWNERS

Buy your repair parts direct from the manufacturer of your car.

We carry a complete stock of repair parts and can make shipment the day order is received. Our stock includes a complete supply of Weidely 12-cyl. motor parts.

THE PATHFINDER COMPANY, Indianapolis, Ind.

BARGAINS IN USED PARTS

Our stock of parts is large and complete. Our service is as good as you will find anywhere. All our goods are sold on a money back guarantee. Give us a trial.

We Specialize In Parts For:

Buick 1917	Overland 1915	Dodge
Kissell 1916	Ford	Hudson
Dorris 1917	Mitchell	Chandler
Metz 1916	Maxwell	
Krit 1915	Cadillac	

Special Bargains In Magnetos

Bosch, high tension, D4	$18.00
Bosch, high tension, D6	22.50
Bosch, high tension, DU4	32.50
Bosch, high tension, DU6	32.50
Bosch, high tension, DR4	22.50
Bosch Coils	6.00 to 9.00
Simms, 4 Cyl.	12.50
Eisemann	5.00 to 15.00

STANDARD AUTO SALVAGE CO. 3931 Olive Street ST. LOUIS, MO.

PARTS, ACCESSORIES, AND SUPPLIES NEW AND USED

We have ready for immediate shipment a large stock of Magnetos, Carburetors, Complete Motors, Bodies, Axles, Blacksmith Anvils, Spark Plugs, Electric Motors, Fuel Tanks, Vises, Speedometers, Lenses, etc., etc. We furnish everything for the motor car at surprisingly low prices.

Send for Bargain Price List

What do you need? Let us send you special prices. Get our complete list and look it over. See what you can save.

Write today

Auto Parts Company

Houston, Texas

YOU THINK YOU KNOW THE BEST PLACE TO BUY AUTO PARTS AND SUPPLIES. TRY PURITAN NEXT YOU WILL LIKE US BEST

LOWER PRICES—HIGH QUALITY —BETTER SERVICE—WILL WIN YOUR APPROVAL

LIGHTING GENERATORS

6-volt Wagner for Saxons	$20.00
6-volt Menominee for Fords and other light cars	15.00
6-volt Bijur	15.00
6-volt Auto-Lite	15.00

STARTING MOTORS

6-volt Wagner for Saxons	$20.00
6-volt Bijur with Bendix Drive	15.00
6-volt Ward-Leonard with Bendix Drive	15.00
6-volt Detroit with Bendix Drive	15.00

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6-volt Detroit with Bendix for Saxons	$20.00
Delco	25.00

COILS

Bosch Dual Type "A"	$10.00
Connecticut 6-volt	8.00
Atwater-Kent Type C.C. 6-volt	5.50

DISTRIBUTORS

Connecticut—4 cyl.	$10.50
Atwater-Kent—Type C.A.—4 cyl.	10.50
Atwater-Kent K-2—4 cyl.	10.50
Atwater-Kent K-2—6 cyl.	10.50

SWITCHES

Leece Neville Starting	$1.75
Puritan Starter	1.25
Connecticut Lighting and Ignition Type HND	7.50
Lighting Switch with dimmer coil	.75

STARTING BATTERIES NEW AND GUARANTEED

6-volt—80 Ampere	$25.00
12-volt—for Dodge and Maxwell	36.00

KHAKI TOPS

Suitable for

Maxwell—Dodge—Chevrolet 490—Briscoe

ALL NEW AND COMPLETE WITH CURTAINS AND DUST BOOTS

READY TO PUT ON YOUR CAR $25.00

RIMS AND WHEELS

We have an enormous stock of all makes and sizes of demountable rims and wheels—have them right in stock and can make immediate shipment.

Write for Prices

RADIATORS

Brand-new Honey Comb radiators for all makes of cars; guaranteed to be right. No matter what car you may need a radiator for, write us for prices.

SPRINGS

New Springs for all cars. Write for Prices

ALL PARTS FOR ALL CARS

Puritan Machine Co.

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NEW

Overland Motor Parts, 83-B and 85-4 and New Bosch Magnetos Purchased from the British War Mission

NEW BOSCH MAGNETOS

(These magnetos all have Mica condensers and were built for British Government use.)

Brand new DU4 variable spark	$ 29.50
New Stromberg LB2 1¼ carburetors	7.50
Whitney chains for Autolite generators	2.25
Simms SU4 magnetos	15.00
Stanley Anti-skid chains for solid tires, single or dual types; sizes up to 36x5, per set	8.00
Peerless running board pumps	1.75
Roller Smith charge and discharge indicators	1.25
Axle shafts for Overlands, any model	3.50
Garco brake lining, size 2x3 1-16 in. per 100 ft.	27.50

400 Brand New 83-B and 85-4 Overland Motors

Complete motor with clutch and flywheel	$150.00
With Bosch DU4 magneto, Autolite generator and starter	215.00

We can furnish any part of these motors at 25 per cent to 40 per cent saving.

Note These Prices

Clutch Spider, complete, including bearing	$ 5.00
Cylinder block	24.50
Cone clutch assembly	15.00
Cylinder Head	9.75
Crankcase lower	16.50

We can furnish Pistons, Rings, Connecting Rods and all motor bearings, timing gears, or any part of

Write Us for Prices

B Presto tanks	$4.00
1916 Ford hood and radiator covers, PER SET	2.15
High grade inner tubes, factory surplus, 28x3 to 37x5, ALL SIZES	1.85
MILLER RELINERS, in original boxes—ALL SIZES	1.60
SCHRADER TIRE GAUGES, in dozen lots or more, each	.95
SCHRADER VALVE INSIDES, per Hundred	4.15

We Sell Only New Merchandise

Tell Us Your Wants Our Prices Are Lowest

All orders shipped C. O. D. SUBJECT TO YOUR INSPECTION.

LETERSTONE SALES CO.

72 Roosevelt Road Chicago

WONDERFUL BARGAINS

Listed below are only a few of our bargain prices on Tires, Tubes and Accessories.

30x3 and 30x3½ Non-Skid Tires	$ 8.00
All other sizes, Non-Skid Tires	10.00
30x3 and 30x3½ Tubes	1.35
All other size Tubes	1.65
One-piece Work Suits, all sizes	2.25
Crown Fenders for Ford cars	12.25
Speedster Radiators	9.00
Speedster Windshields	7.50
Speedster Tops	8.00
Bethlehem Spark Plugs, all sizes	.33
Johns-Manville Spark Plugs, all sizes	.25
Speedster Bodies for Ford	40.00
Speedster Bodies for Maxwell	65.00
Speedster Bodies for Overland	60.00
Bosch DU 4-cyl. Magnetos	32.50
Motors—all kinds	$60.00 up

Write us for our catalog or whatever parts and supplies you are in the market for.

Our Prices Are Right.

AUTO AUCTION CO.

726-28 W. Jackson Blvd., Chicago, Ill.

PISTON PINS

Guaranteed high-grade piston pins for Fords, $0.20; Overland, any model, $0.35; Continental 7WA103, $0.50; Buick model 45 D & H, $0.30; Studebaker, Dodge, and many others.

Burgess-Norton Mfg. Co.

Geneva, Ill.

WRITE

Auto Parts Co.

FOR

Repair Parts

We Can Save You 50% to 75% OFF Manufacturers' List

SPECIAL—Garage and Repairmen—Our new Bulletin of Used Parts and Prices is now ready for you. With this Bulletin in your shop you can supply repair parts for all makes and models of cars listed and increase your repair business. It is free. Write for it today.

SERVICE—Every inquiry will receive prompt attention. Orders shipped same day received. Satisfaction guaranteed or money refunded.

Auto Parts Company

4107 Olive Street ST. LOUIS, MO.

GRAY'S AUTO GARAGE

3212-14 BRIGHTON RD., NORTH SIDE PITTSBURGH, PA.

Studebaker frame, block, parts and pieces; Ford frames, blocks, parts and pieces; under ground gasoline tank and pump $75 (complete); several oil tanks $3.50 each; Hudson, Mitchel Klein, Ford and Chevrolet rear ends; fine panel truck body; several auto bodies; Dodge, Paige, Studebaker, Buick, Ford and several truck radiators, auto gas tanks; Presto tanks; seat cushions, windshields; any size new or used inner tubes; starters; generators; high tension magnetos; coils; carburetors; solid tires, any size rim; any size new or used tire; any size, type or style rebuilt battery; any size truck or auto spring; vises; anvils; jacks; pumps; Ford or Auto mud guards; lamps, head lights, bumpers. Several fine autos for sale at bargain prices; fine line of auto bodies; Winton front axle, body and crank shaft; Atterbury truck, crank shaft. Buick housings, crank shaft, gears and axles.

FORD SPECIALS

One-third to one-half off (used but good as new) Blocks, heads, crank shafts, housings, gears, wheels, axles, pieces, parts, frames. Write or wire.

HAL OWNERS

We can make immediate shipment of any part required in the repair of your Hal motor.

Don't pay a premium for, nor run the risk of using, second-hand parts when you can get NEW PARTS, exact duplicates, made from original patterns, by ordering direct from the factory that built your motor.

Deal with headquarters and be assured of good reliable parts at a fair price.

WEIDELY MOTORS COMPANY - - - - - - - - - - - - - Indianapolis, Ind.

MARION OWNERS

Buy your repair parts direct from the manufacturer of your car. We carry a complete stock of repair parts and can make shipment the day order is received.

We operate the original factory service department.

MARION MOTOR SERVICE CO. Indianapolis, Ind.

GEARS

Transmission and Differential Gears in Stock

New and Guaranteed

For Over 100 Different Makes of Cars

Prompt Shipments. Money Refunded on Parts Not Used, if Returned Within 10 Days
Liberal Discounts to Jobbers, Dealers, Garage and Repairmen

WRITE US YOUR NEEDS

AMERICAN GEAR COMPANY
Manufacturers & Distributors
2131 Michigan Ave., Chicago, Ill.

Speed or Power

for the Ford or Chevrolet 490.

INSTALL A SET OF:

2¾—1 Gears in the Race Type
3 —1 Gears in the Roadster
4 —1 Gears in the Delivery or Taxi

OUR TRADE MARK—A star on every gear insures quality

All ratios $15.00 set.

Detroit Radiator & Specialty Company
963 Woodward Ave. DETROIT, MICH.

AUTO TOPS

TOP RECOVERINGS
BACK AND SIDE CURTAINS
SEAT COVERS
For All Cars
SPECIALS FOR FORDS
Complete Roof and Back, Ready to Put On.

Roadster	$ 8.75
Touring	11.60
ONE MAN Touring Tops, complete	36.00

SEAT COVERS

Roadster	$6.75	Touring	$11.00

GENERAL OR SPECIAL FORD CATALOG
Sent Free Upon Request
SPECIAL DISCOUNTS TO DEALERS

ATLANTA AUTO TOP AND TRIMMING COMPANY
153 Edgewood Ave., ATLANTA, GEORGIA

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EXCEPTIONAL VALUES IN MOTORS
We have parts for the following cars:

American Underslung
Auburn 30-40
Buick F-10-16-17-19-25-28-29-30-31
Burg 40
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Chalmers F-K-L & Six 10-11M-18—Clark 40
Cadillac 1909-1910
Cameron—Crawford
Detroiter—Enger 40
E. M. F. 30—Fal Car
Flanders 2 & 3 speed
Firestone Columbia
Fuller
Ford—N. R. & S.
Great Northern
Halladay—Haynes 1910
Herreshoff—Hupp 20
Hudson 20
I. C. H. 2 & 4 cylinder
Jackson 2 & 4 cylinder
Olympic-Majestic 45-50E
Kissel Kar 40
King—Knox 40
Lambert 2 & 4 cylinder
Lexington 40
McFarland Six
Marathon 30-40
Marmon 30—Rear axle & transmission
Maxwell 2 & 4 cylinder; K-Q-25—Mitchell 40
Moon 40
Mason "May Tag" 4 cyl.
Monarch 40—Moline
Monroe
Overland 30-32-35-38-41-42-52-56-59-69-71-75BR-79-81-83
Oldsmobile 40
Oakland 2 & 4 cyl. 30-40
Packard 1910—Premier
Paige Detroit 25 H. P.
Pullman 40
Reo 2 & 4 cyl. 4th & 5th
Rider Lewis—Sellers
Rambler 34-40-44-53
R. C. H.—Regal 30
Stoddard Dayton 40
Studebaker 14-25-35
Velie 30-40
Winton Six
Wayne

Complete Motors, Transmissions and Rear Axles. Money refunded on all parts within 10 days if unsatisfactory.

Buy Your Parts in WICHITA, KANSAS

AUTO SALVAGE & WRECKING CO.

PARTS

ALWAYS TEARING 'EM UP—
—AND SELLING THE PIECES

YES! PARTS FOR ALL CARS

Magnetos, Gears, Motors, Transmissions

Radiators
Axles
'n Ever'thing

ALSO TIRE BARGAINS GALORE

OKLAHOMA CITY - OKLA.

TIRES TUBES ACCESSORIES

Just Write

Newton's Auto Salvage

When you are in the market for Anything for the Automobile

New and Used
Gears—Axles—Bearings—etc.

FORD—

Speedster Bodies	$ 65.00
Cloverleaf Bodies	233.00
Touring Bodies	260.00

Write for particulars

The Cut Rate Accessory Store

205-11 10th St. Des Moines, Ia.

AUTO Save 50-90% for 400 Cars PARTS

1910-1919 Buick, Cadillac, Dodge, Studebaker, Pope, Packards, Pierce, Etc.

Motors	$25.00 up	Presto Tanks	$ 4.50 up
Magnetos	4.00 "	New Spotlights	2.00 "
Carburetors	3.00 "	Generators	10.00 "
Rear Axles	15.00 "	Gears	1.00 "
Front Axles	5.00 "	Bearings	1.00 "
Cylinders	5.00 "	Radiators	10.00 "

Jobbers in Bankrupt Auto Supplies

BRIGHTMAN AUTO EXCHANGE
321 Windsor Ave. Hartford, Conn.
Largest Exchange in New England

Write For PARTS For the following Cars

Abbott-Detroit E44 B
Brush
Buick to 16
Cadillac-10
Chalmers-36 Model 17
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Cole-30 and 1914 Series 9
Cutting-12
Detroiter-13A
E.M.F.—all models
Empire 31
Flanders 20, 2 & 3 speed
Franklin-10
Gay Truck model G 1914
Hudson-20-33
Hup 20
Imperial 34
Jackson 52
Kissel Kar 10 LD 11
Krit 20
Metz 22
Maxwell to 15
Mitchell to 16
Moline 10 M35
Oakland 25-35-40-42
Overland to 16
Rambler 10
Regal—all models to 13, underslung 20 & 25
Reo to 16
Saxon Baby 4
Stoddard-Dayton H10
Studebaker 13 4 cyl.
Velie 32

THE BONEYARD Washington, Iowa

NEW GEARS

FOR ALL MAKES OF CARS

Transmission and Differential Gears

AT A SAVING

Also Axles, Universal Joints, Clutch Parts, etc. Lowest prices consistent with quality and

A GUARANTEE

with every part shipped. Complete satisfaction or your money refunded in full.

DAYTON AUTO PARTS CO.
1623 McGee Street Kansas City, Mo.

Pre-Inventory Smash

Lewis Rear Axles	$25.00
Little Gem Screw Drivers, per gross	4.50
Copper Rivets, all sizes, per pound	.38
Ford Radiators, 1916	14.00
⅜-inch Steel Balls, per 1,000	4.75
4 Stitched Leather Ford Belts, 1916	.12
Ball Pin Hammers, 100 assorted	30.00
End Wrenches, 100 assorted	18.00
5-inch Square Shank Screw Drivers, per 100	8.00
Brake Lining, 2x⅛-inch, all standard makes, per foot	.10
Carter Carburetors, all sizes, each	15.00
Ford Speedster Bodies	$65.00
Portable Thief-Proof Tire Racks, holds and locks securely 16 tires and 24 tubes. Price,	$20.00

THE M. & M. COMPANY
Automobile Material
Cleveland, Ohio
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AXLES! AXLES! AXLES!

New process, carbonized 100% stronger, every make of motor. Send old axle.

McCADDEN MACHINE WORKS, INC.
St. Cloud Minnesota

RIMS — RIMS — RIMS

New Firestone Q. D. 34x4½, $5.00; 36x4½	$5.50
34x4 Firestone S. S. Slightly. Used	3.00
32x4 Firestone, Q. D., Slightly Used	4.00
30x3½ Stanweld Q. D. Slightly Used	2.00
36x4½ Stanweld S. S. Slightly Used	3.00

All Rims and Rim Parts in Stock.

KASTNER RIM COMPANY
2125 Michigan Avenue Chicago, Illinois

Tires
Parts & Repairs

UNDERSLING YOUR FORD

CRAIG-HUNT Parts are the safest and BEST COMPLETE SET, for lowering the Ford Frame $25.00

We make 16 valve Racing Heads, Racing Bodies, Pistons and counterbalances for the Ford

CRAIG-HUNT, Inc.
910 North Illinois Street, Indianapolis, Ind.

RIMS ALL MAKES WHEELS

Pneumatic Tire Wheels for Ford Trucks.
Five Detachable Wire Wheels for Fords.
Complete Catalogue on Request

CHICAGO WHEEL & RIM CO.
2010 Wabash Avenue CHICAGO, ILL.

Lozier Owners—Why buy counterfeit repair parts? We have all Original Parts. Made from original patterns. Order from headquarters.

LOZIER MOTOR COMPANY
FORT AND 6th STREETS, DETROIT, MICH.
SERVICE STATIONS:
E. A. Cornley, Inc., 1445 Bush St., San Francisco, Cal.
Lozier Motor Co., 47th St. & 11th Ave., New York City

SPEEDWAY BODIES for FORDS

$100 Underslung parts with body free, or parts alone, $12.50 per set.

MORTON & BRETT
811 E. 23rd Street Indianapolis, Ind.

USED PARTS

We have one of the largest and most complete stocks of used parts from 50 to 75 per cent off manufacturer's list price. We have new axle shaft ring gears and pinions for all makes of cars.

EUREKA AUTO PARTS COMPANY
448 N. Illinois St. Indianapolis, Ind.

NEW AND USED
PARTS FOR ALL CARS
SPRINGS AND AXLE SHAFTS MFGR'D.
Satisfaction or Your Money Back

DRENNON & ZAHN
449-51 MARIETTA ST., ATLANTA, GA.

SPRINGFIELD, MO.

Makes a Bid for Your Parts Business

We carry a large line of parts of late model cars and are in position to give you satisfaction. Our prices are 50 to 75 per cent below manufacturer's list. Send us your next order and let us demonstrate.

England Motor Co.
218-20-22 Pacific St., Springfield, Mo.

Racing Seats for racing cars or for rebuilding old cars into racy speedsters. Stylish, attractive, substantially built and inexpensive.

Write for circulars

THE AMERICAN AUTOMOBILE ACCESSORIES CO.
Cincinnati, Ohio

OWNERS!!

Lyons Knight

Complete stock of parts for LYONS KNIGHT roadster and touring car.

At a Great Saving

Indiana Auto Parts & Tire Company
COHN BROS.
318 N. Illinois St. **Indianapolis, Ind.**

Hupp 32 & EMF Parts

160 DIFFERENT MAKES CARS in PARTS
SEND US YOUR OLD PIECES
PROMPT ATTENTION

UNITED AUTO WRECKERS
Main Yard, 541-549 Wyoming St., Dayton, O.
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Tires
Parts & Repairs

Broadway Tire Jobbers

Jobbing

America's Best Make

SECONDS

Surplus and Obsolete Stocks

Our Prices Will Interest You
Why Not Write Us NOW?

BROADWAY TIRE JOBBERS
250 West 54th Street NEW YORK

You can't TIRE us asking quotations

DEALERS' ATTENTION

40 and 10% off list on Loumau tires, 4,000 mile guarantee, and Armstrong Gray tubes, guaranteed for one year.

We have three carloads of Loumau tires for immediate disposal. The Loumau tire is a white tread, gray side wall, made of high grade quality material with heavy, thick non-skid tread. This consists of new stock, wrapped in original factory paper and carry name and serial number.

The following prices are good for the entire month of November. Read our prices:

Size		List Price	Dealers' Confidential Price	Armstrong Tube
30x3	Rib only	$14.75	$ 7.97	$1.85
30x3½	Non-skid	18.70	10.10	2.10
32x3½	"	21.85	11.80	2.50
31x4	"	29.20	15.77	3.00
32x4	"	29.70	16.04	3.10
33x4	"	31.20	16.85	3.25
34x4	"	31.85	17.20	3.40

War tax paid by us, which means another 5% saving for you. Trial order will convince you. No deposit required. Goods shipped same day order is received, C. O. D. subject to examination. SPECIAL prices quoted on carload lots. Write to

The Armstrong Tire Company

1344 Michigan Avenue CHICAGO

RETREADED AUTO TIRES

Are highly serviceable if cured in the proper mold. In buying your new mold be sure that it has:
FIVE CLAMPS. Less clamps can not give the proper pressure.
WATER GAUGE. To know at all times you are curing with steam.
SAFETY VALVE. One that you can rely upon.
STEAM GAUGE. That registers accurately.
FLANGE. On each end of mold to prevent overflow.
BASE. That is one piece and strong enough to carry mold.
MACHINE FINISH. A retread mold must be of sufficient weight to hold heat, and be machined to a smooth finish.
THIRD CIRCLE. Not called a third and only measure a quarter.
UNIT PLAN. Each mold should be separate and independent of the other to insure easy working.
THE CRESCENT RETREAD TIRE MOLD is the only mold sold today embodying all of these features
Write for our new catalogue, it explains it all.

CRESCENT MACHINE COMPANY
Office and Factories
Hill and Forge St. Akron, Ohio

SUPERB DOUBLE TREAD TIRES

Are selling at one-fourth the usual tire cost to convince you of their quality, material and workmanship, and are **GUARANTEED 4,000 MILES.**

We also carry a complete stock of New Tubes at factory prices.

Size	Tire	Tube	Size	Tire	Tube
28x3	$4.75	$1.50	34x4	$ 8.25	$2.35
30x3	5.00	1.65	37x4	10.75	2.50
30x3½	6.00	1.70	34x4½	9.75	2.50
31x3½	6.25	1.80	35x4½	10.00	2.50
32x3½	6.50	1.80	36x4½	10.50	2.50
34x3½	7.50	1.80	35x5	11.25	2.50
31x4	7.50	2.10	36x5	11.50	2.60
32x4	7.75	2.20	37x5	11.75	2.60
33x4	8.00	2.25			

RELINER FREE WITH EVERY TIRE

When ordering, state whether you want straight side or clincher, plain or non-skid. Send $1.00 deposit for each tire ordered, balance C. O. D., subject to examination. We allow a special discount of 5% if you send the full amount with the order.

SUPERB TIRE & RUBBER CO.
2543 Indiana Ave. Dept. B. Chicago, Ill.

Tires *Tires* *Tires*

We Not Only Sell

TIRES & TUBES

But We Give You Real Merchandise, Service and Satisfaction at Prices That Can't Be Equaled

A satisfied customer is our biggest asset, therefore we must satisfy you. A trial will convince you.

NEW TIRES AND TUBES
4000 Mile Guarantee

Size	New Tires	New Tubes	Size	New Tires	New Tubes
30x3	$ 7.95	$1.95	34x4	$17.28	$3.40
30x3½	10.34	2.30	34x4½	23.28	4.15
32x3½	12.15	2.40	35x4½	24.28	4.25
31x4	15.98	3.00	36x4½	25.24	4.40
32x4	16.23	3.05	35x5	28.88	4.60
33x4	16.98	3.25	37x5	29.98	4.75

Add 10% to the above prices for non-skid.

SLIGHTLY USED AND FACTORY REPAIRED TIRES AND TUBES

Size	Used Tire	New Tube	Size	Used Tire	New Tube
30x3	$4.00	$1.95	35x4	$8.25	$3.50
30x3½	5.00	2.30	34x4½	8.50	4.15
32x3½	5.50	2.40	35x4½	8.75	4.25
34x3½	6.00	2.60	36x4½	9.00	4.40
31x4	6.50	3.00	35x5	9.75	4.60
32x4	7.25	3.05	36x5	9.75	4.70
33x4	8.00	3.25	37x5	10.00	4.75
34x4	8.00	3.40			

Send $1.00 deposit with each tire ordered. Tires will be sent promptly with privileg of examination and balance C. O. D. Specify style of rim to avoid delay.

Our Used Tires are not guaranteed for any definite number of miles, but we will make reasonable adjustments on all tires that do not give service in proportion to the price paid, providing tires are returned to us by prepaid express. Is not this fair enough?

Lincoln Tire & Supply Company

1429 S. Michigan Avenue CHICAGO, ILL.

TWO FOR ONE

FREE! FREE! FREE!

A Tube with each Tire, absolutely free. Slightly used and factory repaired

TIRES & TUBES

Used Tire and a Tube Free

30 x 3	$ 5.50	34 x 4	$ 9.50
30 x 3½	6.50	34 x 4½	10.00
32 x 3½	7.00	35 x 4½	10.25
31 x 4	8.00	36 x 4½	10.50
32 x 4	8.75	35 x 5	11.00
33 x 4	9.50	37 x 5	12.00

Send $1.00 deposit with each tire ordered. Tires will be sent promptly C. O. D. with privilege of examination. Specify style of rim to avoid delay.

EAGLE TIRE COMPANY

1463 S. Michigan Avenue CHICAGO, ILL.

Tires

STANDARD Demonstrating Tires

Send No Money—Just the Coupon

ROYAL TIRE & SUPPLY CO.

1461 Michigan Av. Chicago, Ill.

Ship Express—Parcel Post (state which) slightly used. DEMONSTRATING TIRES AND TUBES with privilege of examination. If satisfactory, will pay C. O. D. Want S. S.—Cl.—(state which).

Size	Tire	Tubes	Size	Tire	Tubes
30x3	$6.50	$1.75	34x4	$12.50	$2.35
30x3½	7.50	1.90	33x4½	13.50	2.50
32x3½	9.00	2.00	34x4½	13.50	2.60
31x4	9.50	2.05	35x4½	14.00	2.65
32x4	10.50	2.15	36x4½	15.00	2.75
33x4	11.50	2.25	35x5	15.50	2.85
			37x5	16.50	2.95

Name .....

Address .....

Size Tires ..... Tubes .....

Postoffice ..... State .....

5% ALLOWED IF FULL AMOUNT IS SENT WITH ORDER.

Tires

TIRES & TUBES

New, Used and Double Tread

NEW TIRES
NEW, FRESH STOCK
Exceptional Bargains

Size	Tires	Tubes	Size	Tires	Tubes
28x3	$ 8.60	$1.85	35x4	$20.60	$3.50
30x3	8.35	1.80	33x4½	23.60	3.75
30x3½	10.80	2.20	34x4½	24.40	3.90
32x3½	12.70	2.30	35x4½	25.50	4.05
34x3½	14.80	2.70	36x4½	25.90	4.60
31x4	16.65	2.85	35x5	29.10	4.90
32x4	16.95	2.90	36x5	29.90	4.75
33x4	17.70	3.00	37x5	30.75	4.90
34x4	18.10	3.10			

ADD 10% FOR NON-SKID

SLIGHTLY USED TIRES

Obtained from Wrecked Cars and Factory Repaired

Size	Tires	Tubes	Size	Tires	Tubes
30x3	$ 4.50	$1.35	34x4½	$ 9.00	$1.75
30x3½	5.50	1.45	35x4½	9.25	1.80
32x3½	6.00	1.50	36x4½	9.50	1.85
31x4	7.00	1.65	38x4½	15.00	2.50
32x4	7.75	1.60	40x4½	15.00	.....
33x4	8.50	1.70	42x4½	25.00	4.00
34x4	8.50	1.70	35x5	10.25	2.00
35x4	9.00	1.75	36x5	10.25	2.00
33x4½	9.00	1.75	37x5	10.75	2.20
			38x5½	15.00	.....

DOUBLE TREAD TIRES

Selected from best used material obtainable.

RELINERS FREE

Two tires, one with good top and other with good sidewalls, are trimmed, cemented and sewed firmly together by Campbell lock stitch method, twelve to fourteen plies fabric making puncture and blowout almost impossible.

Size	Complete tire	You furnish one tire	You furnish both
28x3	$ 4.15	$ 3.00	$ 1.50
30x3	4.75	3.35	1.50
30x3½	5.80	4.25	2.00
31x3½	6.50	4.50	2.00
32x3½	6.75	5.25	2.00
34x3¾	7.00	5.60	2.25
31x4	6.95	5.75	2.50
32x4	7.15	5.65	2.50
33x4	7.80	6.25	2.50
34x4	8.00	6.45	2.50
35x4	8.75	7.15	2.50
36x4	9.40	7.50	2.50
33x4½	9.25	7.60	3.00
34x4½	9.65	8.00	3.00
35x4½	10.15	8.20	3.00

Express Must Be Prepaid on Old Tires Sent to Us

$1.00 Deposit Required with each tire ordered, balance C. O. D., subject to examination.
Specify Style of Rim

AUTO NEEDS COMPANY

1602 Michigan Ave. Chicago, Ill.

Tires

50% Off List Price

One of the Best Known Brands of Cord Tires of Standard Make

ABSOLUTELY NEW TIRES
Price List Ribbed or Non-Skid

	List Price	Our Price
30x3½	.....	$15.00
32x3½	$ 43.40	21.70
32x4	55.30	27.65
33x4	56.70	28.35
34x4	58.30	29.15
32x4½	62.25	31.12
33x4½	63.90	31.95
34x4½	65.50	32.75
35x4¼	.....	33.35
36x4½	68.70	34.35
33x5	77.75	38.87
35x5	81.55	40.77
37x5	85.35	42.67
36x5½	97.90	48.95
38x5¼	103.55	51.77
36x6	126.00	63.00

For $3.00 additional on each tire, regardless of sizes.

We Will Guarantee in Writing the Same Tire for 8000 Miles

Prices subject to 2 per cent if cash accompanies order. OTHERWISE C. O. D.

Illinois Auto & Tire Company

412 N. Illinois St. Indianapolis, Ind.
Phone Main 6201

The Karchmer Auto & Supply Co.

Slogan is satisfaction or your money refunded. Our stock is composed of a large line of clean used parts marked at a price to save you money. Immediate shipment made. Try us. Factory rebuilt tires at a big saving. All sizes.

600-02-04 Jefferson St., Springfield, Mo.

Tires

FREE TUBES FREE

2,000 Guaranteed Tubes

With each New or Used Demonstrating casing purchased of us during this sale, we will include FREE of charge one guaranteed tube of corresponding size.

Guaranteed New (Non-Skid) Tires

New Fresh Stock

30x3	$ 8.85	33x4	$18.70
30x3½	11.25	34x4	19.10
32x3½	13.10	34x4½	25.65
31x4	17.55	35x4½	26.80
32x4	17.80	37x5	33.35

All other sizes in proportion

Slightly Used Demonstrating Tires

New Tube FREE with each casing ordered

30x3	$ 6.25	34x4	$11.50
30x3½	7.25	34x4½	13.00
32x3½	8.25	35x4½	13.10
31x4	9.70	36x4½	14.00
32x4	9.80	35x5	15.00
33x4	10.90	37x5	16.00

Mail Orders filled same day as received. Goods shipped C. O. D. Send $1.00 as deposit for each tire ordered, balance to be C. O. D., subject to your examination.

MONEY CHEERFULLY REFUNDED
If goods are not satisfactory upon arrival

Serlin Tire Co.

1300-1302 Michigan Ave. Chicago, Ill.
Phones—Calumet 3407-3408

Tires

SLIGHTLY USED TIRES AND TUBES

Carefully Selected
Standard Makes Only

Size	Tire	New Tube	Size	Tire	New Tube
30x3	$4.50	$1.95	32x4½	$9.50	$4.00
30x3½	5.50	2.30	33x4½	9.00	4.15
32x3½	6.50	2.40	34x4½	9.00	4.15
31x4	7.00	3.00	35x4½	9.50	4.25
32x4	7.50	3.05	36x4½	10.00	4.40
33x4	8.00	3.25	35x5	10.00	4.60
34x4	8.50	3.40	37x5	11.00	4.75

Specify weather Q.D., Clincher or Straight Side; $1.60 deposit required on each tire ordered. Balance C.O.D. subject to examination.

We allow a special discount of 5% for cash in full with order.

Special Quantity Discount to Dealers

EUREKA TIRE & RUBBER CO.

1547 Michigan Ave. Chicago, Ill.

Tires. Rebuilding and Repairing.

SATISFACTORY DOUBLE TREAD TIRES

Sell at one-fourth the usual tire cost and our guarantee of 4,000 miles convince you of their material, quality and workmanship.

Also a complete stock of new Tubes at factory prices.

Size	Tire	Tube	Size	Tire	Tube
28x3	$4.75	$1.50	34x4	$ 8.25	$2.35
30x3	5.00	1.65	37x4	10.75	2.50
30x3½	6.00	1.70	34x4½	9.75	2.50
31x3½	6.25	1.80	35x4½	10.00	2.50
32x3½	6.50	1.80	36x4½	10.50	2.50
34x3½	7.50	1.80	35x5	11.25	2.50
31x4	7.50	2.10	36x5	11.50	2.60
32x4	7.75	2.20	37x5	11.75	2.00
33x4	8.00	2.25			

Reliner Free with every tire. State whether you want straight side or clincher, plain or non-skid when ordering. Deposit of $1.00 for each tire ordered, balance C. O. D., subject to examination. Special discount of 5% if you send full amount with order.

SATISFACTORY TIRE & RUBBER CO.
2551 Indiana Ave. Dept. A. Chicago, Ill.

Tires. Rebuilding and Repairing.

OLD SOLID TRUCK TIRES
on Rims

Write for Price

LEO MEYER CO. Akron, Ohio

Cylinders Reground
Pistons, Rings, Wrist Pins, Fitted
Crankshaft Grinding
Magneto Parts and Repairing
Official Sims-Huff Service Station
E. H. ODOM BROTHERS CO.
19 James St. ATLANTA, GA.

Rebuilding & Repairing

Restore Your Motor's Efficiency

If you are not getting the full, steady power from your motor, it is likely due to cylinder trouble. LET US REGRIND THE CYLINDERS AND REPLACE THE PISTONS AND RINGS. We specialize in this work and guarantee all our work. Special rates to repairmen.

Bridgeport Piston Ring Company
Third St. & Conn. Ave. Bridgeport, Conn.

SCORED CYLINDERS Repaired by the EAGLE Patented PROCESS

We do not heat the cylinder or enlarge the bore, thereby saving the expense of new pistons and rings. Mechanical Process. All Work Guaranteed. 24-hour service.

Eagle Machine Co., 24 N. Noble St., Indianapolis, Ind.
Detroit Auto Machine Co., 1682 Gratiot Ave., Detroit, Michigan.
Stafford Motor Car Co., 22nd and Campbell St., Kansas City, Mo.
The New Haven Machine Co., New Haven, Conn.

SHIP WORK TO NEAREST ADDRESS

Litter Motor Machine Co., 240 N. 4th St., Columbus, Ohio.
Trindl Machine Works, 57-61 E. 24th St., Chicago, Ill.
Gladish Machine Works, 508 Broad St., Chattanooga, Tennessee.

For territory rights, write to
EAGLE MACHINE CO.
Indianapolis, Ind.

CYLINDER GRINDING - WELDING - CRANKSHAFT GRINDING
OVERSIZE PISTONS, RINGS AND PINS
Write for Price List
HEINE MACHINE WORKS, 4160 Minnehaha Ave., MINNEAPOLIS, MINN.

THE LARGEST PLANT IN THE U. S.
AND THE BEST EQUIPPED—SPECIALIZING ON
crank shaft regrinding, cylinder regrinding and repairing of scored cylinders, is at your service. We do not file and lap crank shafts but grind them on special machines. We have a battery of machines for cylinder regrinding and use the famous Eagle process for scored cylinders. We also shrink starter steel ring gears on fly-wheels.
NO WAITING FOR WEEKS—QUICK SERVICE—ABSOLUTE SATISFACTION
A TRIAL IS MOST CONVINCING—SHOOT 'EM IN
STAFFORD MOTOR CAR COMPANY KANSAS CITY, MO.

REPAIRMEN
There is money in regrinding with a Heald No. 60, built for that purpose. Two thousand in use. Keep the business in your locality.

WRITE FOR BLUE BORDER BULLETIN NO. 6 ON
CYLINDER REGRINDING
THE HEALD MACHINE CO., WORCESTER, MASS.

OWNERS
The Heald No. 60 puts pep into your cylinders, reduces your gas and oil bill, and makes motor as good as new. Insist on Heald ground cylinders.

CYLINDERS REGROUND

Standard or Oversize. Iron Pistons, Piston Pins and Rings for All Makes. Standardized prices. Send your work NOW!

Bu-Nite

Bu-Nite Bearing Metal
Reduces consumption of lubricating oil.
Eliminates the wear on cylinders.

Conforming Split Skirt Piston
Patent Applied for

Bu-Nite Light in Weight
Smooth running engine.
More power.
More mileage.
Reduces wear on bearings.

Bu-Nite Split Skirt Conforming
Fitted very close.
Holds compression.
Stops oil troubles.
No piston Slap.
Compensating for expansion and contraction.

BUTLER MFG. CO.
1124 E. Georgia Street INDIANAPOLIS, IND.

CYLINDER and CRANKSHAFT GRINDING

We offer you the services of expert mechanics, modern high grade equipment, and years of experience in this business.

Our special Light Alloy and Grey Iron Pistons insure more power and speed because of extreme accuracy and extra lightness.

Satisfaction and prompt deliveries

WRITE TO US

We also do spur and bevel gear cutting

Auto Engine Works
St. Paul, Minn.

PHONE
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2320
QUALITY
SERVICE

THE TRINDL CO.
PISTONS—PISTON RINGS—WRIST PINS
CYLINDER GRINDING
SCORED CYLINDERS REPAIRED
CRANKSHAFT GRINDING
"RAJO"—"Valve-in-Head for Fords"

57-61 East 24th Street
CHICAGO
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SCORED CYLINDERS

REPAIRED BY THE ONLY SUCCESSFUL PROCESS

LAWRENCE PATENT PROCESS

SEE our display adv. in this issue for list of plants where to ship cylinders

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SEND YOUR **CYLINDER GRINDING** TO KANSAS CITY

We have a fine plant, equipped with the most modern facilities for cylinder grinding and fitting of pistons and wrist pins. Our workmen are experts. All jobs inspected before shipping.

QUICK SERVICE AND ATTRACTIVE PRICES TO GARAGE AND REPAIR MEN

1505 McGee Street HARRY LEE MACHINE WORKS Kansas City, Mo.

CYLINDER AND CRANKSHAFT GRINDING

Oversize Piston, Rings and Wrist Pins made to fit. Skilled mechanics and Special Accurate Machinery. WRITE FOR OUR BOOKLET FOR PRICES AND USEFUL INFORMATION.

MODERN AUTO REPAIR CO.
4601-3-5-7-9-11 & 13 Olive St., St. Louis, Mo.

Steel Gear Rings

For Self-Starters

For replacements or new installations

Silent Chain Sprockets

For

Generator & Magneto Drives

Our Prices Will Interest You

The Adapt Machinery Company
1624-1632 S. Wabash Ave. Chicago, Ill.

Save Old Motors

BORING

Grinding Cylinders AT ONE SETTING

Ship Your Block to Us

STANDARD TOOL and ENGINEERING CO.
Cor. Indiana and Lafayette Streets
South Bend, Indiana

Send it to—

HARTFORD

Cylinders Reground

Pistons and Rings accurately fitted. Best equipped plant in New England. Prompt Delivery.

Charter Oak Machine Company
438 Asylum St.
HARTFORD CONN.

Cylinder Rebored and Reground

fitted with light grey iron pistons, leakless rings, pins and bushings. Highest quality workmanship, reasonable prices. Oldest established plant in the Northwest. All work guaranteed.

McCADDEN MACHINE WORKS
St. Cloud, Minn.

Cylinders Reground

Scored or cracked cylinders welded. Oversize Pistons and Rings furnished.

Emerson Manufacturing Co.
1075 Gratiot Ave. Detroit, Michigan

SEND YOUR

CYLINDER AND CRANKSHAFT GRINDING

TO US

We have the most up-to-date shop equipped with Special Accurate Machinery, and manned by expert mechanics, for grinding cylinders and crankshafts. Manufacturers of Oversize Pistons, Rings and Wrist Pins for any make of car. Gasoline engines overhauled. All work guaranteed. Write today for our booklet containing prices and other valuable information.

Louis J. Doerr Auto Repairing Co.
18th and Allen Streets St. Louis, Mo

CYLINDER REBORING

FOR PASSENGER CARS—TRUCKS—TRACTORS We have the capacity and the skilled workmen. Satisfaction guaranteed. "ONCE A CUSTOMER—ALWAYS A CUSTOMER" is our motto. We are also specialists in high grade PISTONS, RINGS and PINS. Special attention given to Trucks and Tractors.

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GEAR CUTTING & GEAR MANUFACTURING.

All kinds of Gears cut

CRAGO MACHINE WORKS
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Rebuilding & Repairing

Cylinder Grinding

CARL YOUNGSTROM CO.
417 12th St., Des Moines, Ia.

Crankshaft Grinding

Expert Cylinder Grinding

Oversize and standard pistons, rings and wrist pins. We use our famous Double Lap Joint piston rings. Scored and cracked cylinders repaired. Work guaranteed.

WOODRUFF ENGINEERING CO.
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Special Light-Weight Grey Iron Pistons

Cylinder Grinding

by expert machinists. Best equipped shop in Iowa. Fords Special. Special prices to Garagemen. All work guaranteed. Prompt service.

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CYLINDER GRINDING

Manufacturing of oversize Pistons, and Wrist Pins, for all makes of Cars, Trucks and Tractors. All work guaranteed. Best workmanship.

Send for Our Price List

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Humboldt & Concordia Ave., Milwaukee, Wis.

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Ask us about reaching a Responsive Market for you.

Clearing House Adv. Department
MOTOR AGE
Mallers Bldg. Chicago

CYLINDERS REGROUND

$5 to $10 per cylinder. All our work guaranteed. Rings. Alloy pistons, from $1.50 to $3.50 per cylinder, extra. Ford cylinders reground and fitted with pistons, rings, wrist-pins and bushings.

Racing Motors a Specialty
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ALL PARTS DUPLICATED

Cylinders Reground. General Machine Work for Foreign and American Cars. Welding of All Metals. Manufacturers of CATELAIN HOSE COUPLING, U. S. Shock Eliminators. Authorized Ever Ready Battery Service Station and Sheet Metal Work.
QUICK SERVICE; SATISFACTION GUARANTEED

ANDRE CATELAIN
1446-8 Indiana Ave. CHICAGO, ILL.

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Piston Rings and Wrist Pins Fitted. Machine work of all descriptions.

DELCO IGNITION SPECIALISTS
WM. BENDER
1829 Indiana Avenue Chicago, Ill.

WE GRIND

Cylinders and fit special heat-treated Pistons. Welding of all kinds of Metals. Gear Cutting of all kinds. Scored Cylinders Repaired and Guaranteed for the Life of the Motor.

PONDELICK BROS.
Largest Mrgfs. of Duplicate Auto Parts in U. S.
Leavitt St. & Jackson Blvd. Chicago, Ill.

CYLINDERS REGROUND

Best equipment and expert mechanics mean high class work—our kind. Special attention given to tractor work. Yes—we duplicate parts and do welding. Prompt service.

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St. Marys, Ohio

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of Cylinders and Welding of Broken Parts constitutes our main business. On badly scored cylinders we use old pistons by putting sleeve in cylinder. We maintain one of the largest and best equipped plants in the West for this work. Try us for real satisfaction.

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BOSCH MAGNETOS

All Sizes in Stock—Reasonable prices
Parts for Bosch Magnetos in Stock

Expert Repairing of
Magnetos, Generators and Starters

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2063 Farnam St., Omaha, Nebr.

Magnetos & Service Stations

Noble Automobile Heaters

"The Super System"

Are being sold and installed by many Dealers this winter. Why not you? Enter this profitable field and keep things buzzing during the usual dull period.

Write today for complete details.

PELLET MAGNETO CO.
Starting — Lighting — Ignition & Heating
25th & WABASH CHICAGO, U. S. A.
"The Service with the Spark"

Why buy a new machine and wait indefinitely for delivery when you can get a good used machine overhauled by us "like new" for very much less and get immediate delivery besides?

This business was established 1893. We make a specialty of SECOND-HAND ELECTRIC MOTORS AND GENERATORS and bargains in new machines. We have the largest stock in America, abundant capital (capital and surplus, $500.000.00). "Cash" talks in this business. We sell CHEAP for CASH.

Send for our "Monthly Bargain Sheet" showing complete stock on hand (revised monthly), with the lowest net prices

NOTE—We list herewith a fine lot of 220-volt D. C. motors. We have just as big a stock of A. C. motors. Send us your inquiries.

220-VOLT D. C. MOTORS

H. P.			Speed
1	1	Rochester	1675
1	1	Crocker-Wheeler, form L	1600
		L	1600
3	1	Western Electric	1300
1	1	Western Electric direct-connected to "Yankee" twist drill grinder, complete	1300
3	1	General Elec. type CA	1275
1	1	Watson	1200
5	1	Western Elec.	1150
1	1	Allis-Chalmers	1150
1	1	Colonial	900
1	1	Jenney, double-reduction, geared	1700
1	1¼	Westinghouse	1250
1	1 1-3	Allis-Chalmers	1600
1	2	Gen. Elec., type C. Q.	2000
1	2	Watson	1700
1	2	General Electric, type CVC, shunt interpole	1250
1	2	Allis-Chalmers	1150
1	2	General Electric, type C. Q., complete, backgeared	1100-275
1	2½	Ft. Wayne	1400
2	2½	Thompson-Ryan, interpole	1225
1	2½	Milwaukee	1025
1	2½	Crocker-Wheeler, form L	875
		Smith "Economy" single stage centrifugal pump (capacity 55 gals. per min.—45 ft. head)	1894
1	3	Watson	1650
8	3	Western Electric	1650
1	3	General Elec., type CVC shunt, interpole	1650
1	3	Holtzer Cabot	1600
2	3	Bartz-Wygand & Brown	1525
2	3	Westinghouse	1500
1	3	Crocker-Wheeler, form L	1437
1	3	Fairbanks-Morse	1400
1	3	National	1100
3	3	Gen. Elec., type CE	1050
1	3½	Westinghouse, MP, type M	950
1	3½	Westinghouse, type SK, comp. interpole, variable speed	375-1500
1	5	Crocker-Wheeler, form L	1850
1	5	Gen. Elec., type CF	1100
1	5	National	1000
1	5	Gibbs	935
1	5	Westinghouse, MP, type S, comp., variable spd. with Westinghouse reversible drum controller and resistance	875-1450
3	5	Watson	850
16	5	Colonial, comp.	580
2	5	Gen. Elec., type RL, form B, shunt, variable speed	500-1500
1	7½	Colonial	1575
1	7½	Northern, comp.	1450
1	7½	Watson	1350
1	7½	Browning, MP	1300
1	7½	Sterling	1000
1	7½	Sprague-Lundell comp., printing press motor	140
1	10	Robbins & Myers	2100
2	10	Crocker-Wheeler	1700
1	10	Western Electric	1400
1	10	C. and C., MP., type S, comp.	1375
1	10	Gen. Elec., type CQ	1250
1	10	Robbins & Myers	1225
2	10	Allis-Chalmers	1150
1	10	Gen. Elec., type RC, comp., interpole	1150
1	10	Jenney	1060
1	10	Cincinnati	900
1	10	Fisher	850
2	10	Fairbanks-Morse	700
1	10	Crocker-Wheeler, MP., type 1, variable speed	720-1200
1	10	Gen. Elec., type CQ	650
1	12	Western Electric	1200
2	13	Crocker-Wheeler	1100
1	15	Allis-Chalmers	875
1	15	Jenney	850
1	15	Western Electric	775
1	15	Gen. Electric	690
1	15	Gen. Electric	625
1	15	Triumph	520
2	17	Crocker-Wheeler, MP., type 1, variable speed	700-1400
1	20	Lincoln	540

Send for our "Monthly Bargain Sheet" showing complete stock on hand (revised monthly), with the lowest net prices.

GREGORY ELECTRIC CO. 16th and Lincoln Sts., Chicago, Ill.

MAGNETOS

REPAIRED

ERIC J. GUSTAFSON
413-415-417 So. Winnebago St.
ROCKFORD, ILL.

MAGNETOS

Generators, Starters, Coils. Specialists in Rebuilding and Repairing. Official Service Station on North East: Atwater Kent, Delco, Bosch, Remy, Klaxon, Bearing Service, Gill Piston Ring. Distributors USL Batteries.

ELECTRICAL SERVICE CO.
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Wanted: Scrap Platinum

We will pay highest prices. Small amount especially solicited. Send in what you have. We will forward cash in return.

PAUL G. NIEHOFF & CO., Inc.
Metallurgical Laboratories
232-242 E. Ohio Street Chicago, Illinois

ELECTRIC SPECIALISTS

Starters, Generators, Magnetos, Coils, Cutouts and Armature rewinding. Parts and Units in stock. 24-hour service. Chicago Distributors for Prest-O-Lite Batteries, Gas Tanks and Appliances. Dept. A.

Automotive Electric Service Corp.
116-18 East 33rd Blvd., Dept. "A" Chicago, Ill.

ATTENTION

GARAGE and REPAIRMEN! Equip your repair shop with **THE ONAN TESTING DEVICE,** a test rack to drive and test all kinds of generators, magnetos and starters. Inquiries solicited. Manufactured by

DAVID W. ONAN
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WE CAN FIX IT — **IF IT'S ELECTRICAL** — WE CAN FIX IT

FACTORY SERVICE—GENUINE PARTS—EXPERT REPAIRS

Westinghouse—Connecticut—K W Magnetos—Dyneto—Philbrin—Jesco—Berling Magnetos—Heinze Ford Starters—Norma Bearings—Waltham and Van Sicklen Speedometers—Bendix Drives—Philadelphia Batteries, etc.

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2837 South State Street Established 1903 CHICAGO

Bluff City Electrical Company

MEMPHIS, TENN.

Official representative for Bijur, Westinghouse, Eisemann, Ericsson Mfg. Co., etc.

EXPERT REPAIR SERVICE
on Magnetos, Starters and Ignition

ELECTRIC LIGHT Your Ford

Dealers Write for Special Proposition

System Includes Generator Battery Side Lamps Tail Lamp Switches Wiring, Etc.

This Simple Complete Electric lighting system for your Ford eliminates the troublesome, smelly kerosene lamps. Can be installed easily and quickly by anyone without removing fan or radiator. No complicated parts. Automatic Cut-out on generator makes it "fool-proof."

This system fits any Ford, and can be installed by any one in three hours. All necessary instructions are furnished. Order today—direct from this "Ad"—do not delay and be disappointed.

COMPLETE $17.50

Complete Ready to Install

We are original distributors of Auto Parts and accessories for ALL CARS. Rims, Wheels, Axle Shafts, Radiators, Magnetos, Lighting Generators, Storage Batteries, Starting Motors, Springs, Prestolite Tanks, Windshields, Steering Wheels.

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Radiators come complete, black enameled, ready for Mounting
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A Quick Turnover Manufacturers

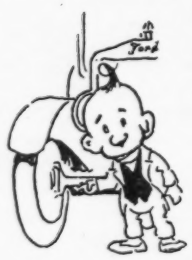
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MOTOR AGE

No lot too small or too big to dispose of. Send us a list of your odds and ends, and without in any way of obligating you we will submit a specimen Clearing House Advertisement along with advertising rates.

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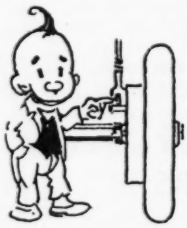
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The little chap has his eye on the noisy spots—steering rods—brake rods and doors and he knows how to fix 'em—with the Fernald rattle stoppers.

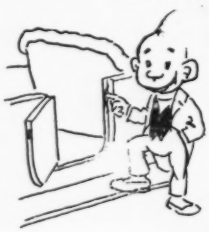
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clamp over the steering rod and prevent wobbling. Keep wheels in line, save bushings and prevent needless wear on front tires. For Fords, Dodges, Maxwells and other light cars, 50 cents a pair.



LITTLE B-R-A-T-S

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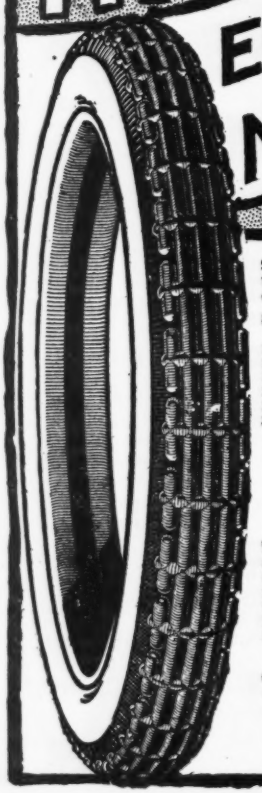
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32x3½	6.50	2.25	35x4½	9.50	3.25
31x4	7.25	2.50	36x4½	9.75	3.30
32x4	8.00	2.60	35x5	10.50	3.65
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WONDER WORKER

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brings out the factory finish of your car as it stood out in the beginning. It cleans through the grime, grease, oxide deposits; dissolves dried-on oil or wax polishes; leaves no oily surface to collect dust and gum over. It gives one result on old cars and new—the fine, hardy, factory-lustre.

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HARTFORD, CONNECTICUT

Under Contract I Will Bind Myself to Purchase and Consign Cars with Motor Car Merchants for One Year

WITH MY CONTRACT IN YOUR SAFE YOUR STATUS WILL CHANGE FROM THAT OF AN AUTO DEALER TO THAT OF MOTOR CAR MERCHANT!

Analyze—Don't Generalize.

ALL BUSINESS IS a gamble. The able business man is he who reduces the gamble to a minimum.

Two great risks in business must be eliminated.

(1) OVER MERCHANDISING—If your stock is too large you are sure to lose money.

(2) UNDER MERCHANDISING—If your stock is too small you will never become a really successful merchant

My contract will assure you a sufficient stock at ALL times, today, tomorrow and every day of the year.

Your Success Absolutely Depends on Scientific Merchandising.

YOU KNOW THAT if you wished to purchase a suit of clothes, a piano or a watch, you would demand that the clothing merchant, the dealer in pianos or the jeweler, showed you a varied stock to choose from.

You would demand further that he make delivery immediately or as quickly as could any of his competitors.

What you require of the other merchant when you are a "prospect" he naturally requires of you when he is the "prospect."

He will "shop around town" for his motor car just as you shop for your requirements.

BUT the motor car merchant who receives the order must be able to create demand by displaying various models of cars and satisfy that demand with quick delivery.

Outstrip your competitor and be the first motor car merchant in your community to meet those business requirements.

You Require Capital—Not Short Time Loans

MY CONTRACT TAKES CARE of that requirement. I bind myself to purchase and consign with you all the motor cars you require and bind myself further, for one year, that as you sell a car I will reinvest the proceeds in other cars and consign them with you.

I know of no motor car financing company who will enter any contract at all with you.

They will lend you money on your cars for 90 or 120 days, but at the end of that time, if you haven't sold the cars, they can call the loan and "wipe you out" overnight.

Sometimes they do this—You and I both know of numerous cases where they have.

My contract is for one year, and if you deserve, desire and require it, I'll renew year after year. Never before in any industry has such an offer been made.

My Offer

I WILL AGREE WITH you upon a sum of $5,000 up to $100,000 and I will then, upon your request, purchase that amount of cars and consign same with you—you deposit 20% upon them, and store the cars in the warehouse or display and sell them in your show-room.

WHEN YOU SELL A CAR MY PROCEEDS COLLECTED FROM THAT CAR WILL BE INVESTED IN ANOTHER—I CONTRACT TO KEEP MY INVESTMENT IN MOTOR CARS IN YOUR STOCK FOR ONE YEAR AND YOU CONTRACT TO PAY ME A SMALL SHARE OF YOUR GROSS PROFITS.

That plan is constructive and safe for you. If you are an intelligent merchant you owe it to yourself to investigate thoroughly my offer and compare it with all other plans for financing motor cars.

What Millionaires Pay for Capital

The Standard Oil Company has recently issued Preferred Stock carrying an annual dividend of 7%. The newspapers published that they paid Morgan & Co. a handsome commission for selling the issue.

Other millionaire corporations have recently issued 8% Preferred Stocks and sold same at less than Par. Together with commissions that long time financing cost some of those companies more than 10% per annum. And those same companies can borrow money for 90 and 120 days at their banks and pay as low as 3½% to 4% per annum for it.

BUT THEY KNOW that a merchant CAN'T EXPAND his business on short time loans—that only takes care of the peak load. What they can't accomplish you surely cannot.

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However, even though my contract assures you financial assistance year by year, I charge you less than do other motor car finance companies who only offer you dangerous 90 and 120 day loans.

It will prove vital to your business if you write me and investigate.

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Phone Columbus 8258



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Ask a ZENITH dealer for a demonstration.

Zenith Carburetor Company

New York **DETROIT** **Chicago**

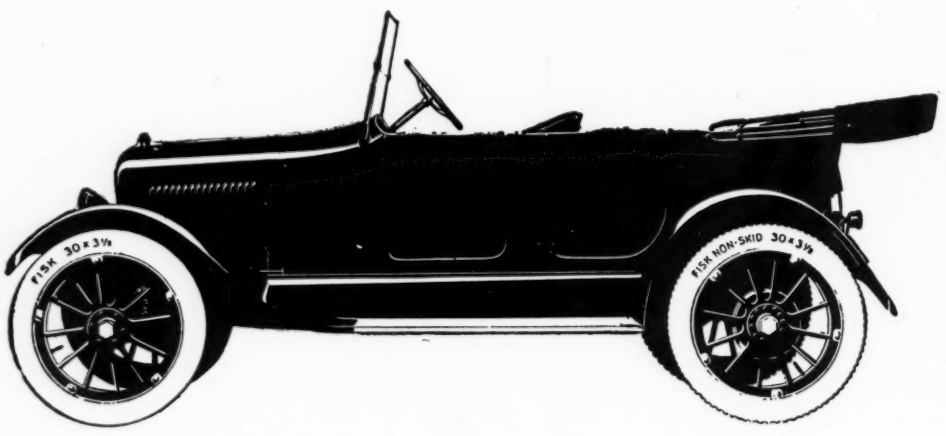
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